FACTORS INFLUENCING PATIENTS' DEMAND FOR X-RAY EXAMINATIONS IN RURAL KWAZULU-NATAL

by

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SUPERVISOR: PROF. ADH BOTHA

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Dedications

I dedicate this dissertation to:

My lovely wife, Febby, for her support, motivation and desire to see her husband advance in studies. She has been through frustrations and loneliness brought about a husband frequently absent.

My two daughters, Chilombo and Zewelanji, who had to put up with none participating father sometimes…..

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DECLARATION

I declare that ***FACTORS INFLUENCING PATIENTS' DEMAND FOR X-RAY EXAMINATIONS IN RURAL KWAZULU-NATAL*** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references and that this work has not been submitted before for any other degree at any other institution

…… …….

BERNARD MUNG'OMBA **DATE**

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FACTORS INFLUENCING PATIENTS' DEMAND FOR X-RAY EXAMINATIONS IN RURAL KWAZULU-NATAL

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ABSTRACT

The focus of this study was on the problem of unwarranted demand for radiological imaging by patients in rural KZN of South Africa. Literature in the context of this topic is scarce. Consequently the aim of this study was to describe sociodemographic factors that might influence patients demand for x-ray examinations.

A quantitative in the form of a cross sectional survey was done. A convenient sample of 110 patients was surveyed using a structured questionnaire. Results of the study indicate that age, and educational level might influence patients' demand for x-ray examinations. The study also revealed that very few respondents 10.9% (n=12) had knowledge about x-rays. The study further revealed that there might be other factors such as patients' perceived benefits of x-rays, beliefs, lack of public health awareness as well as lack of effective communication between patients and health care providers.

KEY CONCEPTS

Conventional radiography; Patients; Diagnostic imaging, radiation; radiological testing; unwarranted demand; x-ray examinations; medical x-rays

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List of abbreviations **Page**

GP	General Practitioner
HBM	Health Belief Model
ICRP	International Commission on Radiation Protection
KZN	KwaZulu-Natal
MRI	Magnet Resonance Imaging
OPD	Out Patient Department
PHC	Primary Health Care
TB	Tuberculosis
WHO	World Health Organisation

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Addendum C:	Permission letter from the hospital
Addendum D:	Permission letter from The Health Research & Knowledge Management sub-component of the KwaZulu-Natal's department of health
Addendum E:	Summary of ethical clearance from UNISA

CHAPTER 1

ORIENTATION TO THE STUDY

1.1 INTRODUCTION

The discovery of the properties of x-rays just over a century ago gave medicine one of its most powerful and indispensable diagnostic tools (Murray, 2004). It is actually estimated that about 30% to 50% of critical medical decisions are based on x-ray examinations (Tavakoli, Seilanian Toosi & Saadatjou 2003:3). Today, the use of x-rays in both public and private health services is wide-spread in South Africa. And since x-rays are used for diagnostic purposes frequently, it is fairly well known to many patients, in developed urban areas as well as in rural areas not close to modern and sophisticated health care facilities.

Some patients feel it is so important to be x-rayed to the extent that if the doctor does not refer them for x-rays they and their families feel that the doctor has neglected them in some way (Murray, 2004). Many patients, according to Picano (2004a:579), demand examinations because they feel reassured by the use of high tech equipment. The rural hospital in one of the health districts of KwaZulu-Natal (KZN) where the researcher is employed is no exception.

Although the number of performed x-rays is on the rise, the majority of these x-ray examinations do not yield results that will alter or influence the course of clinical management. For instance, a study done in the United Kingdom (UK) on the importance of patient pressure and perceived medical need for investigations showed that physicians believed that about half of the investigation were only slightly necessary or were not needed at all (Little, Dorward, Stephens, Senior & Moore 2004:445). In the same vein, Levin and Rao (2004a:169), argue that much of this rise in demand is unnecessary and wasteful. Thus, the number of radiological studies performed is in excess of those

actually required for diagnostic purposes (Cascade, Webster & Kazerooni 1998:561). These researchers estimate the volume of unwarranted radiological tests in the United

States of America to be in the range of 10%-50%. Picano (2004a:579), on the other hand, writes that up to a third of radiological examinations are totally or partially inappropriate.

The unnecessary use of medical x-rays and the associated radiation risk remain a major concern to many health workers, patients and authorities in some countries (Mubeen, Abbas & Nisar 2008: 118). This, however, is not the case at the rural hospital where the researcher works. Patients here believe that x-rays are essential as a diagnostic tool in many conditions where the doctors' clinical judgment indicates they are not essential. This mindset concurs with the results of a qualitative study on the importance of radiological imaging which showed that 72% of the 93 patients investigated considered radiological imaging as ''very important'' (Balagué & Cedraschi 2006:509). The findings of these researchers and many other studies raise the question of the reasons for the importance patients confer on radiological examinations.

Literature indicates that even with a reduction of up to 50% of x-rays, care and treatment of patients would not be influenced negatively (Murray, 2004). Bouzarjomehri (2003:121) holds the same view: namely, that exposure to medical x-rays can be reduced substantially without compromising quality. Many of these x-ray examinations that are demanded by patients are not in anyway associated with improved physical functioning or reduced pain. Therefore, elimination of these unnecessary x-ray examinations could, apart from leading to significant reduction in the unnecessary radiation exposure to the patient, lessen the undue pressure that is exerted on limited health care resources and budgetary constraints. This may result in a meaningful economic impact. Furthermore, the reduction would accord faster access to radiographic services to those patients who really need them.

1.2 BACKGROUND OF THE PROBLEM

1.2.1 Historical overview of medical x-rays

Radiography started in 1895 after the discovery of x-rays and since then it has become

an integral part of any health care system. Since the discovery, x-rays have been utilised for both diagnostic and therapeutic purposes and its use for medical purposes has continued to grow (Ratnapalan, Bentur and Koren 2008:1293). Currently, radiological imaging is the second most rapidly growing sector of the health care industry (Lee, Saokar, Dreyer, Weilburg, Thrall & Hahn 2007:858). The use of x-rays as a diagnostic tool and their contribution towards patient management is enormous. According to Tavakoli et al (2003:3), the benefits of ionising radiation to the patient are considerable in terms of comfort, diagnostic and therapeutic effectiveness. However, x-ray examinations can be expensive and x-rays are potentially hazardous.

Unlike other aspect of preventative health care like patient drug compliance, very few studies have been conducted on factors influencing the demand for radiology or x-rays as a predominant diagnostic tool. It seems as if some of the patients believe being x-rayed will cure the sickness or prevent it. In the perception of this researcher, patients' demand for x-ray examination is high at this KZN rural hospital compared with the demand at other hospitals where the researcher worked before.

Patients' knowledge about x-rays may be an important factor in influencing their behaviour in connection with x-rays. Poor knowledge of x-rays by patients at this KZN rural hospital, for instance, may account in part for the high numbers of patients demanding x-ray examinations. Furthermore, poor knowledge may also lead to misconception and myths about medical x-rays.

1.2.2 X-ray utilisation

Ideally a request for an x-ray examination is determined by clinical factors. Therefore performance of an x-ray examination, regardless of the results, should be beneficial and should significantly influence the course of patient care management. However, in the experience of the researcher, most patients visiting the Out Patient Department (OPD) of

the rural KZN hospital where the researcher is employed insists on having an x-ray done irrespective of their clinical conditions. From the patient's perspective, if the doctor does not refer him/her for the x-ray examination, the patient and his/her relatives feel that the

doctor has in some way neglected them. To an extent, this concurs with the results of a study practice which showed that patients were likely to give a low rating for care in cases where they perceived that their legitimate requests were denied or ignored (Kravitz, Bell, Azari, Krupat, Kelly-Reif & Thom 2002:47). Even though the x-ray examination in itself does not relieve pain, a lot of patients prefer to have it done because they believe it is essential. This mind set is in line with the views of Werner (2008:28) who indicates that both health providers and patients in general seem to have faith in imaging as a useful tool. What the patients know and believe about x-rays, however, appears to be a problem, because they are not aware of the specific indications.

The result of what is described above is the substantial overuse of x-ray examinations resulting in unnecessary radiation exposure of patients, unnecessary demand for professional time and the monetary cost which is enormous in relation to the limited health care resources. Studying the validity of radiological requests, Blake (1995) reported that at least 20% of radiological examinations carried out in the UK's National Health Service (NHS) were clinically unhelpful. This, he added, translates to an annual average of seven million unnecessary x-ray examinations for the whole country costing about £60million (R780million). In this vein, Bairstow, Mendelson, Dhillon and Valton (2006:51) are of the view that unwarranted services are the most significant threat to the effective allocation of health care resources. Patients' lack of adequate knowledge about the cost, limitation and associated risks of diagnostic x-rays may be potential barriers to effective reduction of unwarranted x-rays.

Hence in order to better understand and help patients change this behaviour, which in this case is the demand for x-ray examinations, health care workers need to be aware of factors that influence patients to behave in the way they do. Therefore, an effective health education promotion strategy to stem this trend will necessitate sound and fact-based knowledge of factors that influence patients' demand for x-ray examinations.

1.3 POSSIBLE FACTORS THAT COULD INFLUENCE PATIENT BEHAVIOUR

In order to curb patients' demand for x-ray examinations it is important to know and understand factors that influence them.

1.3.1 Perception

Perception, according to Wallace, Robertson, Millar and Frisch (1999:1144), could be either positive or negative on a theme; which is x-ray examination in this regard. Perception is affected both by internal and external factors. Internal influences includes past learning, motivation and expectation.

The way patients perceive the benefits and risks of medical x-rays is often subjective. Patients' views of benefits and risks are frequently such that they differ from medical assessment. Therefore, one is likely to assume that the perception of a patient will be influenced by many factors.

1.3.2 Influence of health workers on patient behaviour

Issues related to health care workers is another set of modifying factors that have been identified as having influence on patients' preference for medical x-ray. The manner in which health staffs advise a patient the first time he/she demands to have an x-ray could have an impact, even in cases where x-rays are not requested by the doctor. For instance, a study conducted by Espeland and Baerheim (2003) identifies issues other than clinical criteria that would affect general practitioners' decisions about ordering plain radiography for back pain. Some of the issues identified by these researchers are related not only to patients' wishes but also to pressure from other health care providers. This, though, is despite the fact that the use of medical x-ray imaging should be rightfully determined by clinical factors.

1.3.3 Public health media campaigns

Of late public health has been moving towards changing health-related behaviour by focusing on individual behavioural risk factors such as drug and alcohol abuse, smoking and encouraging women to undertake mammography screening (Corso, Hammitt, Graham, Dicker & Goldie, 2002:93; Chin, Monroe & Fisicella, 2000:317). While health-related media campaigns have been used to improve individuals' knowledge and behaviour towards a number of health issues such as tuberculosis, malaria and HIV/AIDS, very little has been done about informing the public about the risks associated with medical x-rays.

For instance, a study done in Finland on the evaluation of written patient educational materials in the field of diagnostic imaging emphasised the need for patients to be well informed when coming for a radiographic examination (Ryhänen, Johansson, Virtanen, Salo, Salantera & Leino-Kilpi 2009:e2). Awareness campaigns, pamphlets and education should be used to inform both patients and health workers about the benefits, costs and risks associated with medical x-ray imaging. This might reduce patients' demand for x-ray examination and thereby enhance effective utilisation of medical x-rays.

1.4 PROBLEM STATEMENT

In the present era of increasing cost, attention has been given to the use of public health resources including medical x-ray imaging. Yet with regard to the utilisation of medical x-rays little success has been recorded. This failure, according to Wilson, Dukes, Greenfield and Hilman (2001:257), may be that not enough is known about the determinants of the use of radiological testing. In particular little is known about factors influencing patient preferences for x-ray examination. If factors which influence patients' demand for x-ray examination were to be identified it might be possible to

change this patient behaviour which in some ways is detrimental to the very health they are trying to improve. Thus, successful implementation of strategies that will reduce

unnecessary use of medical x-rays by patients will need to be informed by research (Martin, Bates, Sussman, Ros, Hanson & Khorasani 2006:8).

The problem is that this researcher could not find a specific study that has been done to describe and explore factors influencing patients' demand for x-ray examinations, specifically in South Africa. Furthermore, the little literature on the factors influencing patient demand for x-ray examination brought to the fore the fact that medical x-ray services and factors that prohibit or enhance its utilisation by patients remain complex. Yet, the researcher has over years of practice in several hospitals in this region noticed an upward demand for diagnostic x-rays by patients. This demand has been characterised by possible unwarranted radiation exposure to the patients and wastage of scarce health care resources. There seems to be a rise in the cost of imaging resources and unwarranted demand for professional time. Why, then, this high expectation? What are the factors influencing patients' high demand for x-rays at a hospital in rural KZN? It is against this background that this study was proposed in an attempt to identify and describe factors influencing patients' demand for x-ray examination.

1.5 AIM AND OBJECTIVES OF THE STUDY

The aim of this study was to describe social demographic factors that influence patients' demand for x-ray examinations in the rural area of KZN.

Objectives of this study are to:

- identify the social demographic characteristics of patients who prefer x-ray examination in rural KZN
- determine the patients' level of knowledge of x-rays.
- determine and or identify factors other than sociodemographic that may influence patients' demand for x-ray examinations in rural KZN.

1.6 SIGNIFICANCE

Although many patients seem to be fond of x-ray examination, serious concerns about health risks have been raised. Previously there has been a mistaken assumption that

exposure from x-ray examination was negligible. But evidence is now overwhelming that there is no threshold dose (Gofman, 2001). This means that every exposure to the x-ray by the patient counts and the consequences accumulate. Therefore, even though general radiography delivers low doses well below 10mGy, it is believed that stochastic effects occur even at these low doses. Hence the International Committee on Radiation Protection (ICRP) considers it scientifically reasonable to assume that the incidence of induced cancer or hereditary effect rises in proportion to increased absorbed dose (Mathews & Brennan 2008:350). Some of the radiation exposure risks include cancer, leukaemia, infertility, skin burns, cataract and genetic effects. In fact the possibility for cell mutations already exists but x-ray exposure can trigger these mutations to begin to develop. A study conducted in the United Kingdom and 14 other countries showed that Japan has the highest annual exposure to diagnostic x-ray and the highest (3.2%) estimated cancer risk attributable to it (de González & Darby, 2004:350).

Because of the technical nature of the topic, radiation risk is typically misperceived by the public in general and the patient in particular. Lack of awareness of the risk associated with x-ray radiation becomes pertinent when one considers the number of patients who receive unnecessary radiation exposure (Shiralkar, Rennie, Snow, Galland, Lewis & Gower-Thomas 2003:372).

Knowing patients' knowledge about x-rays has an important significance for stemming the trend and consequently not only reducing wastage of resources but also protecting patients from unwarranted radiation. Thus, the development and implementation of feasible strategies to reduce unnecessary patient demand may lie in the understanding of influencing factors (Little, Cantrell, Roberts, Chapman, Langridge & Pickering 1998:264). These results can help to formulate a plausible strategy for the reduction of unwarranted x-ray examinations.

1.7 DEFINITION OF KEY CONCEPTS

The word 'concept' according to Ahonen (2008:289), means a mental impression of a certain object or phenomenon.

- *Diagnostic radiation:* Primarily, but not exclusively, x-rays and it also includes fluoroscopy and CT scans (Gofman, 1999). For the purpose of this study x-ray examinations included only conventional radiography.
- *Patient:* Oxford Advanced Learner's Dictionary (2005:1068) defines patient as a person who is receiving medical treatment, especially in a hospital. For the purpose of this study, a patient is defined as any individual who comes to the hospital seeking health services as an in-patient or out-patient.
- *Demand:* Oxford Advanced Leaner's Dictionary (2005:388) defines demand as a very firm request for something that somebody needs. For the purpose of this study demand is can be defined as patient request to have an x-ray examination regardless of the outcome of the clinical investigation.
- *X*-ray examinations in the context of this study means the process of undergoing a general radiographic test by the patient.

1.8 OVERVIEW OF RESEARCH DESIGN AND METHODOLOGY

In chapter 3 the research approach and methodology is described in detail. The following is a summary of that outline.

1.8.1 Research design

Research design is defined as a blueprint for a study (Burns & Grove 2005:211). A non-experimental, quantitative research approach was used in this study. A survey was done, which, according to Polit and Beck (2008:323), is a strategy designed to obtain information about different aspects of people

1.8.2 Study population

Burns and Grove (2005:342) describe population as the entire set of individuals having some common characteristics. In this study the population included all patients seeking health care at the rural KZN hospital where the researcher is employed.

1.8.3 Sample size

A non probability sampling approach: namely, convenience sampling, was used to select a sample of 110 patients.

1.8.4 Data collection

The research data was collected by means of a structured questionnaire over a period of three weeks.

1.8.5 Approach to data analysis

Using Epi 6 info, data analysis included descriptive and inferential statistics. The choice of statistics was based on the fact that most of the variables that were measured were categorical.

1.8.6 Reliability

Some researchers define reliability as dependability of the measurement instrument thus the extent to which the instrument gives the results when repeated (Terre Blanche et al 2006:152). The questionnaire was pilot-tested on patients before the actual study to ensure reliability of data collection instruments.

1.8.7 Validity

Elasy and Gaddy (1998:757) describe validity as the extent to which an instrument measures what it purports to measure. To enhance content validity the questionnaire was pre-tested on a number of patients.

1.8.8 Ethics

An ethics application for permission to conduct a study in the hospital was submitted to the Provincial Health Research and Knowledge Management. Consent from respondents was obtained by means of oral consent. Permission was also sought from UNISA's ethics committee.

1.9 SCOPE AND LIMITATION

This study focused only on patients seeking health care services at a KZN rural hospital. Therefore, results may not be generalised to the entire KZN province let alone to the entire population of South Africa.

This research was limited to studying the factors that influence patient's demand for diagnostic x-ray examinations particularly those seeking health care during day time. This, then, means that those patients who came after hours and during weekends were excluded. Furthermore, convenience sampling was used in the selection of respondents and as this method does not allow for a representative sample to be selected the difference between the sample and the study population was not ascertained. The effect of this bias was, therefore, not determined. Another limitation of this study is that it was cross-sectional representing one point in time. This means that the study was unable to represent possible changes of individual factors over time.

1.10 CONCLUSION

The discussion in this chapter provides the introductory information on the study. The reader was oriented on the background to the study, the problem statement, aim and objectives of the study, as well as the significance of the study.

A review of the literature follows in the next chapter.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Since research is rarely conducted in a vacuum, a researcher usually conducts a thorough literature review in order to familiarise himself/herself with the existing knowledge base (Polit & Beck 2008: 105). A literature review also provides a background to one's research (Brettle & Gambling 2003:229). This researcher undertook a literature review to find out what was already known about factors influencing patients' demand for x-ray examination and also to acquire insight into the topic under study. The literature review covered both theoretical and empirical sources related to this study. Local and international books and journals were consulted. In the experience of this researcher literature related to the topic under study was extremely scarce.

2.2 MEDICAL X-RAYS: A WORLD PERSPECTIVE

The World Health Organisation ([Sa]:2) reports that two thirds of the world's population has no access to basic x-ray services despite the fact that about 80% - 90% of diagnostic problems can be solved using basic x-ray examination. Fortunately, in South Africa almost all public hospitals both in rural and urban areas are equipped with some form of x-ray machine. Radiography has not escaped the technological advancement. Unfortunately, despite the advancement of technology in radiographic equipment, most developing countries still rely on conventional radiography and as such it still remains the core modality as compared to other imaging modalities (Muhogora, Ahmed, Almosabihi, Alsuwaidi, Beganovic, Ciraj-Bjelac, Kabuya, Krisnachinda, Milakovic, Mukwada, Ramanandraibe, Rehani, Rouzitalab & Shandorf 2008:1453). Conventional

radiography involves basic plain x-ray examination. Despite South Africa being a middle income country, the differences in the radiographic equipment found in rural and urban hospitals resemble that of developing countries.

Research has shown that availability and utilisation of radiography for imaging differs from one country to another (Regulla & Eder 2005:12). Further evidence of geographic variation in the use of radiology in the USA has been documented (Lysdahl & Børretzen 2007). Furthermore, a survey done in the USA on the utilisation of radiology shows that almost half of all diagnostic procedures involve conventional radiography (Bhargavan & Sunshine 2005:286). While in Norway trends in diagnostic radiology examinations show that in 2002 conventional radiography accounted for approximately 60% of all imaging procedures (Børretzen, Lysdahl & Olerude 2007:346).

2.2.1 Risks associated with medical x-rays

Apart from Magnetic Resonance Imaging (MRI) and ultrasonography, exposure of patients in conventional or plain film radiography involves ionising radiation. Conventional radiography confers enormous benefits on patient management but this benefit is not without radiation risks. Researchers have argued that diagnostic imaging, which includes conventional radiography, carries small but real risks (Lockwood, Einstein & Davros 2007:121).

Diagnostic radiology is the single largest man-made source of ionising radiation contributing about 14% of total worldwide exposure from man-made and natural sources (Moores, 2006:292; de González & Darby, 2004:345). Serious concerns about health risks in this regard have been raised. In Japan, it was estimated that a cumulative cancer risk of 3.2% is attributed to diagnostic x-ray exposure (de González & Darby, 2004:350). This, according to the same researchers, is equivalent to 7587 cases of cancer per year. Other direct evidence of radiation risk from x-rays comes from epidemiological studies of increased levels of cancer in the exposed human population (Wall, Kendall, Edwards, Bouffler, Muirhead & Meara 2006:285). Even though general radiography delivers low doses well below 10mGy, it is believed that stochastic effects occur even at

low doses. And hence the International Commission for Radiation Protection (ICRP) considers it scientifically reasonable to assume that the incidence of induced cancer or hereditary effect rises in proportion to increased absorbed dose (Matthews & Brennan 2008:350).

The current consensus by international and national organisations on radiation risk is that the risk of radiation-induced cancer and hereditary disease is assumed to increase with increasing radiation dose with no threshold (Wall, Kendall, et al 2006:286). This means that each exposure to the x-ray by the patient counts and the consequences accumulate. Thus: x-ray exposure is an important public health issue particularly in women where imaging of the lower body exposes ovaries to radiation.

Despite the known health risks associated with medical x-rays, many patients still prefer or demand to have an x-ray examination regardless of the doctor's clinical assessment. For instance, results from a cross-sectional survey done in the United States of Africa (USA) showed that 63% of 200 responders were never worried about exposure to radiation when having an x-ray examination (Ludwig & Turner 2002:161).

Despite the fact that information derived from x-ray investigations is often essential in clinical care, it is obtained at a risk that extremely few patients are aware of. Goske and Bulas (2009:902) attribute lack of awareness by many patients to the fact that discussion of radiation risk is a complex topic.

2.2.2 The value of x-rays in medicine

Despite the radiation risks mentioned above, there is simply no doubt that the use of diagnostic x-rays in medicine has many benefits. And one would not want to undermine the potential impact medical x-rays have on diagnostic medicine as an integral part of patient care and management. X-rays provide an opportunity for health care staff, and in particular doctors, to see the inside of the patient without physical operation. This is in line with the views of Manning (2004:171) who writes that although x-rays are the single most important contributor of radiation exposure to the world population, diagnostic x-ray continues to be used because it provides benefits in the care of patients.

From Gunderman's (2005:339) perspective medical x-rays have revolutionalised the way patients and doctors view health and disease.

Medical x-rays are thus a valuable medical diagnostic tool only when sensible

precautions are taken to protect the public and the patient in particular from radiation exposure from x-rays. The decision to have an x-ray examination done must be made collectively by the patient and his/her doctor. And when the request for x-ray examination is justifiable the gain certainly outweighs the risks. In that way, x-ray makes a positive contribution to health and the benefits and insights which ionising radiation makes in medicine can be appreciated (Gofman, 1999).

2.3 MEDICAL X-RAYS IN SOUTH AFRICA

The South African national health system is based on a district Primary Health Care (PHC) system. The first level in this system consists of community hospitals. In this kind of system, the point of first contact must offer comprehensive and coordinated care to the whole community. For the health care to be comprehensive in a PHC setting, patients and in particular doctors at first level community hospitals must have access to a wide range of diagnostic services which also include radiographic services. The challenge for primary care, however is to ensure patient satisfaction without recourse to x-rays (Kendrick, Fielding, Bentley, Kerslake, Miller & Pringle 2001:400).

2.3.1 X-ray services in urban and rural hospitals

As in any other developing country, provision of x-ray services in South Africa is affected by the availability of staff and equipment. Furthermore, radiographic imaging services vary between those that are delivered using the most complex and sophisticated equipment found in academic hospitals and urban areas to the most basic and conventional type in rural areas. Other than the mentioned differences in radiographic services between urban and rural areas, Thulo (2006:1) reports that in South Africa development in radiography technology takes place at different rates at private and public hospitals. Most private hospitals are more advanced in radiography technology

than public hospitals. This difference in technological advancement of radiographic equipment is likely to have an influence on the rate of use of radiographic services by patients in urban and those in rural areas. Patients in urban areas are provided with a wide choice of modalities to suit their needs. This assertion is supported by studies done

in Norway which have documented the difference in the use of radiology between urban and rural areas (Lysdahl and Børretzen 2007)).

2.3.2 Use of medical x-rays in rural KZN

The literature indicates that the use of diagnostic imaging x-rays specifically, has increased in recent years (Gazelle, Halpern, Ryan & Tramontano 2007:518). However, the use of radiological services within KZN rural hospitals may differ from those in urban areas. In the perception of this researcher factors such as belief, knowledge, availability, accessibility and cost may influence the use of x-ray services in rural hospitals. Other than the mentioned factors radiographic services in rural KZN hospitals may also vary according to the complexity of the x-ray equipment. In fact, conventional radiography is the only radiological service available at this rural KZN hospital. X-ray services at this rural KZN hospital constitute a sizable part of patient cost.

2.3.3 Radiation protection and resource allocation

Respect for patient autonomy is one of the cornerstones of contemporary medical ethics. However, respect for patient autonomy, according to Rogers (2002:140), is not the only significant ethical obligation. Equally important is preventing harm, acting for the good of the patient and also taking into account resource allocation. Patient demand for x-ray examination regardless of its clinical benefits results in both unnecessary exposure to radiation and inappropriate use of radiographic resources. (Mendelson & Murray 2007:5). In a rural hospital, like the one where the researcher works, struggling to cope with staff shortage and financial demand, wastage of resources on unwarranted x-ray examinations may have an adverse effect on the provision of legitimately required radiographic services (Hammett & Harris 2002:124). In fact, in some countries such as

the USA, the portion of resources devoted to health care has been under significant debate (Moskowitz, Sunshine, Grossman, Adams & Gelinas 2000:9).

Considering the ever increasing cost of diagnostic imaging and its associated risks many health authorities in many countries have introduced regulations in order to curb the

unnecessary use of diagnostic x-rays (Ch.Triantopoulou, Tsalafoutas, Maniatis, Papavdis, Raios, Safas, Velonakis & Koulentianos 2005:306). However, in many instances, these efforts have yielded little success. And this failure, according to Wilson et al. (2001: 257), may be attributed to the fact that not enough is known about the determinants of radiological use and in particular little is known about factors that influence patient demand for x-ray examination.

2.4 FACTORS THAT COULD INFLUENCE PATIENT DEMAND FOR X-RAY EXAMINATIONS

Even though there is very little literature on factors influencing patients demand for x-ray examination, there is literature from other health-related behaviours that maybe drawn upon to research the background of what factors may influence patients' to demand for x-ray examination.

Abraham (1999) is of the view that if one is to change health - related behaviour there is a need to specify and target beliefs, motivation and situational constraints which maintain particular health behaviour patterns. To considerably reduce unnecessary use of x-rays by patients, reliable predictors of health-related behaviour, for instance possible patient preferences for x-ray, are necessary. And since some of the reasons for demand may not benefit patients' clinical care, it is essential to identify factors influencing patients' demand for x-ray examination (Lysdahl & Hofmann 2009:4). Identifying factors that influence patients' demand for x-ray examination will be vital in the quest to stem the trend.

2.4.1 Factors included in the Health Belief Model

Most of the interventions aimed at individuals' health-related behaviour, according to Lyon and Reeves (2006:284), have been based upon health theories. This is in line with the beliefs of Conn (2009:287) who writes that many researchers wanting to change specific individual health behaviour have in most cases used these theories. The theoretical framework commonly used in health behaviour change is the Health Belief

Model (HBM). This model focuses on individual compliance, efficacy, cost, and benefits of any proposed action. In the context of health, Matsuda (2002:9) identifies two broad variables: namely, the desire to avoid illness and in cases where the patient is already ill, the desire to get well coupled with the belief that a specific health action will prevent illness. A diagram of the HBM is presented below in Figure 2.1.

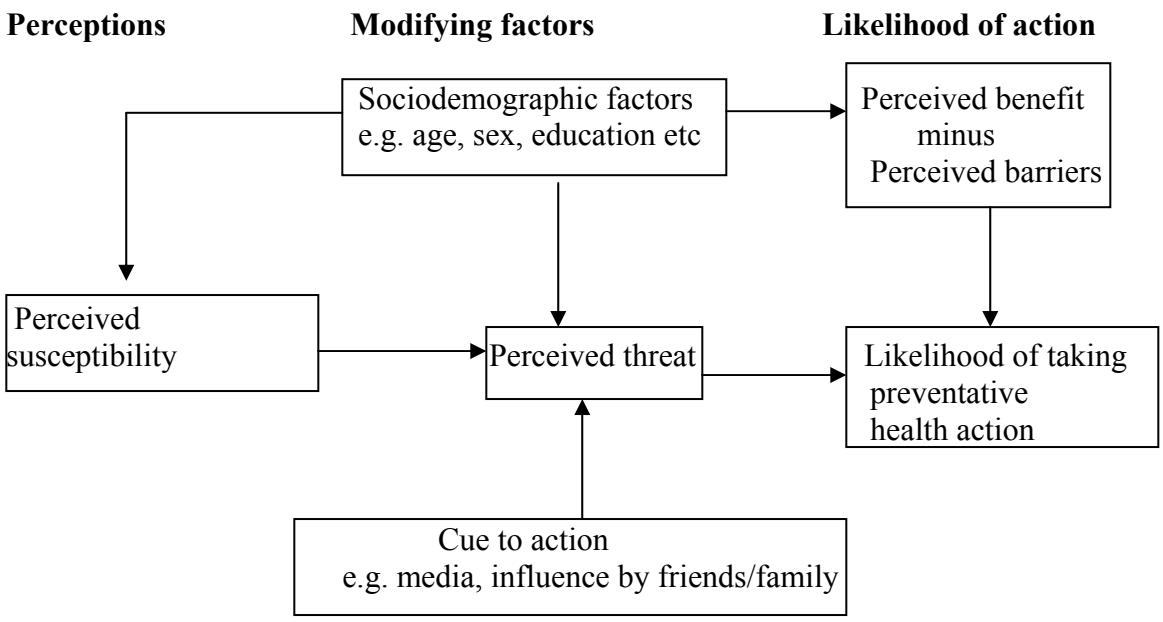

Figure 2.1 Diagrammatic representation of the HBM
Source: Rosenstock, I, Strecher, V & Becker, M. (1994:6)

The model attempts to justify the assertion that the patient's perception of threats posed by the health problem and the perceived benefits of taking action to reduce such a health problem influence that particular patient's health-seeking behaviour. This is also echoed by Petro-Nastus and Mikhail (2002) who note that the HBM stipulates that health related-behaviour is influenced by a patient's perception of the threat posed by a health problem and the value associated with his or her action to reduce that threat. Polit and

Hungler (1999:128) identify major components of HBM which include perceived benefits and costs, perceived susceptibility, perceived severity, motivation and modifying factors. The HBM predicts health-related behaviour by assessing among other factors, individuals' beliefs about likelihood that the behaviour will prevent the illness

and perceived barriers that prohibit taking action. Some researchers argue that the HBM proposes to offer such an explanation utilising health-risk assessment strategies to ascertain those perceived benefits or perceived barriers that may encourage or deter patients from what may be considered positive social practice; in this case it may be demand for x-ray examination (Koch, Roberts, Cannon, Armstrong & Owen 2005:84). In this community it is common to find a patient insisting on having an x-ray because of pressure from family members.

Although the HBM has been used widely by researchers in an attempt to predict health behaviour, it is not without criticism. Some researchers have argued that the model is flawed for several reasons (Chin, Monroe & Fiscella 2000:319). Among the many reasons identified by these researchers are that the model places excessive responsibility for health on the individual while social factors are neglected. Another limitation of the HBM is the failure to consider factors such as environment, economic, social norms and peer pressure. All of these may influence patient health-related behaviour such as the demand for x-ray examination (Denison 1996).

On the contrary, Slama ([Sa]:47) is of the view that although there is no single theory that can encapsulate all factors in health behaviour. Therefore, theories can be used to focus on a particular health-related behaviour. For instance, some researchers have used the HBM to explain behaviours such as examining how individuals take steps to avoid HIV infections or how women avail themselves for mammography for preventative purposes (Koch et al. 2005:85).

2.4.2 Beliefs and attitude

The individual's health seeking behaviour is to a large extent influenced by his/her own culture, beliefs, attitude and values. For instance, the Theory of Reasoned Action, according to Koch, Roberts and Camon (2005:84), argues that beliefs inform attitudes which in turn create behavioural intentions and this predicts human behaviour. In fact, studies on patient drug compliance have confirmed that patients' attitudes and beliefs are important factors that influence drug compliance. (Lan, Shiau & Lin 2003:370).

Applied to this study, x-ray examination may only be seen as a useful intervention if its outcome influences management of a patient in one way or another. Therefore, request for radiological services should be determined by and form part of comprehensive clinical assessment. The demand for x-ray examination by patients thus should be complemented with a basic knowledge and accompanied by an appropriate attitude to its advantages and disadvantages.

Research presents a variety of opinions. A study conducted by Lyndal and Hofmann (2009:8) showed that patients' increased demand for knowledge about their own health was one of the perceived causes of the increased x-ray investigation volume. Therefore, one gets the impression that patients confuse the effects of radiography on outcome measures and its use as a diagnostic tool.

Mahon (1996:1241) is of the opinion that satisfaction is subjective and based on expectation and perception. The same researcher adds that satisfaction is influenced by the degree to which the expectations are fulfilled. On the other hand, Coyle (1999:123) found that dissatisfaction is a complex social construct that is underpinned by a range of values, experiences, attitudes and beliefs.

Thus understanding health behaviour, in this case demand for x-ray examination displayed by patients, is essential if health care workers are to gain the trust and cooperation of patients and thereby reduce the number of unwarranted x-ray examinations. This means that attempts to influence the behaviour of patients should be based on better knowledge of patients' motives, attitudes and beliefs. This is so because some attitudes and beliefs are so strong such that they may influence patients' thinking

and behaviour. Likewise, some attitudes and beliefs are weak and hence prone to situational pressure and may have little impact on patients' health-related behaviour.

2.4.3 Patients' perceived benefits of having an x-ray examination

Perceived benefit is described as the believed effectiveness of the intended strategy to reduce the threat of illness (Denison 1996). The perceived benefit is a construct often

applied to health behaviours. The HBM, for instance, assumes that for one to adopt a behaviour one must see the benefits of doing so (Ludwig & Turner 2002:159). Thus, a patient's perception of the benefit resulting from engaging in a specific health action, in this case demand for x-ray examination is the perceived benefit. The patient's expectation of an outcome from the x-ray test and the value of the expected outcome is in this case the believed ability that the x-ray test will reveal the underlying illness. This may influence the patient's attitude.

Lyon and Reeves (2006:284) state that the original core beliefs are the individuals' perceptions of susceptibility to illness, costs involved in undertaking the behaviour, benefits involved and cue to action. These researchers add that the likelihood of patient demand, in this case for the x-ray examination, is thought to depend on the balance between perceived benefits and barriers to preventative action. In other words, patients' views of the causes of illness influence decisions on what remedial method to employ in an effort to have the illness treated. In fact, Lyon and Reeves (2006:284) are of the opinion that individuals' perceptions about their illnesses appear to play a pivotal role in health behaviour. However, other researchers have argued that patient expectation of benefits can be altered by misconception about radiation risk (Ludwig & Turner 2002:159).

How the individual patient perceives the outcome of x-ray examination may be said to be one of the determinants of radiological utilisation. Presenting a discussion on the use of radiology, Cascade, Webster and Kazarooni (1998:562) reveal that in the absence of a valid clinical indication, patients often demand imaging procedures for reassurance purposes. The purpose of radiographic imaging is to provide information and

consequently reduce uncertainty (Manning, Gale & Kruipinsk 2005:683). Yet many patients consider x-ray examination as being more important than clinical judgment. However, in reality radiographic services were designed to support clinical judgment rather than replacing it. This kind of expectation expresses the patient's judgment of whether the intended action is good or bad.

Besides reasons pertaining to patients and clinicians, some researchers have identified

therapeutic relationship as among the factors that may contribute to the use of radiological imaging (Balagué & Cedraschi 2006:509). Corso, Hammitt, et al (2002:93), however, are of the opinion that preference for prevention and treatment may be motivated by factors other than the ''value'' that a given intervention provides for the individual.

2.4.3.1 The importance of x-ray compared to clinical evaluation

Most of the patients who seek health care services at this rural KZN hospital seem to believe more in the reliability of x-rays than in a doctor's clinical assessment. Similarly, a study done in Norway shows that patients consider plain radiography more reliable than clinical evaluation done by a doctor (Espeland, Baerheim, Albrektsen, Korsbrekke & Larsen 2001:1360). These authors report that some patients are of the opinion that doctors cannot diagnose anything without the use of an x-ray.

Although patients may demand x-ray testing, their expectation should not dictate clinical care and management. Patients' belief in the ability tends to obscure or rather result from their failing to recognise the blind spot of x-ray imaging. Eventually one must question what the clinical values of these x-rays are for individual patients. Therefore, health care workers should strive to respond to patients' demands for unwarranted x-ray examinations emphatically because patients' requests are a common part of clinical encounter (Gallagher, Lo, Chesney & Christensen 1997:667).

2.4.3 Patients' perceived cost of medical x-ray imaging

Cost is one of several factors that can influence the decision of individual patient to request a particular action. In fact, the HBM hypothesises monetary cost as one of the modifying factors that has some bearing on a patient's ability to change and maintain a health-related behaviour. Contribution towards treatment cost, in this case diagnostic imaging, could have an impact on a patient's demand for x-ray examination. And in many instances, it is only when the patient realises that he/she has the capacity to overcome this barrier that he/she would be able to take the required action.

It is true that that high cost of some treatments and health services remains a barrier. In rural areas many people seeking health services may not have a constant source of income. Most of them do not have medical aid insurance either. In the case of radiology, literature has shown that the use of radiographic tests is closely related to socioeconomic factors such as financial resources (Semin, Demiral & Dicle 2006:533). However, some studies have shown that socioeconomic status did not influence the use of conventional x-ray and computerised tomography (Wang, Jason & Shawn 2008:387). Other than cost, Polit and Hungler (1999:128) identify duration, complexity of desired behaviour and accessibility of the services that would support taking a given action.

Most of health care services in South Africa's public hospitals including medical x-rays are almost free at the point of consumption. In other words conventional diagnostic x-ray services in most government hospitals cost almost nothing. In the case of rural patients this may be considered an opportunity to demand x-ray with no regard to unnecessary radiation exposure (no justification) and cost increase to the hospital (Classic 2006). Already, some researchers have raised concerns that the unnecessary use of x-ray imaging may contribute to rising health care cost (Martin, Bates, Sussman, Ros, Hanson & Khorasani 2006:7).

2.4.5 The impact of health workers on patient perception of x-rays

Factors related to health care workers form another set of modifying elements that have been identified as having an influence on patient perception of medical x-rays. The use of medical x-ray imaging is rightfully determined by clinical factors. From the literature it becomes clear that issues other than clinical criteria can affect general practitioners'

decision about ordering x-ray such as plain radiograph for low back pain (Lysdahl & Hofmann 2009:3; Espeland & Baerheim 2003). Some of the issues identified by these researchers are related to both patient expectation and wishes, and pressure from other health care providers, such as physiotherapists who might need an x-ray before providing further treatment.

It is also indicated that patients with a low level of trust in the physician may request

services such as x-ray examination or medication more often (Thom, Kravitz, Bell, Krupat & Azari 2002: 476). Other researchers have, however, suggested that health workers and in particular doctors could instead elicit from patients their expectations (Little, et al. 2004:445). For instance, instead of giving in to a patient's request, the respondents in a study on physician response to patients' requests for antidepressants saw the requests as a prompt to engage in further diagnostic probing or patient education (Tentler, Silberman, Patemiti, Kravit & Epstein 2007:54). The same could be done for patients who demand x-ray examinations.

2.4.5.1 Communication between health workers and patients

In many instances, communication is so natural that the importance of doing it well is often underestimated (Booth 2007:135). However, owing to growing interest in health promotion and disease prevention, health communication in developing countries like South Africa has been encouraged (Alali & Jinadu 2002:81). Some of the roles that effective health communication between health care workers can play, according to these authors, include

- guiding effective health care
- ensuring effective health promotion
- facilitating effective dissemination of health information

Lack of effective communication between health care workers and patients could be another factor influencing patient demand for x-ray examination. Writing in the editorial comment, Haldeman (2001:307) explains in another context that patients seeking spinal

pain treatment encounter difficulties in obtaining consistent information from various health workers as to the relative risks and benefits of treatment options available. Picano (2004b:849) states that despite the fact that a radiological examination carries a definite long-time risk of cancer, patients undergoing x-ray examinations often receive no or inaccurate information about these risks. Moreover, Mitchell (2003:272) reports that information is an important factor leading to an informed choice. Therefore, patients can only make informed decision about x-ray examination when information is provided by

health care workers. It has been argued that it is the responsibility of health care staff to communicate and provide first-hand information about radiation risks to the patients undergoing radiological procedure (Mubeen et al. 2008:118; Ludwig & Turner 2002:159).Yet, a study on what patients know about ultrasound, computerised tomography (CT) and Magnetic Resonance Imaging (MRI) found that many patients (72%) communicated with family members or friends instead of health workers to gain information (Chesson, McKenzie & Mathers 2002:481). These results cast a shadow on the way health professionals communicate and disseminate information.

Literature indicates that patient satisfaction and adherence to health care instructions is linked to better health worker-patient communication (Tongue, Epps & Forese 2005:652). Other studies also show that the level of patient compliance with treatment appears to be related to the amount of information given to the patient by health providers (Lyon & Reeves 2006:285). In fact, quality patient information is considered as an important aspect of today's health care (Sheard & Garrud 2006:43). Effective and clear communication between health care providers and patients with regard to the cost and risk associated with x-rays may influence the trend. Therefore, other than addressing the emotional needs, Ludwig and Turner (2002:159) suggest that health care workers should provide objective facts about x-rays. However, little is known about the extent to which lack of effective communication influences patient demand for x-ray examinations.

2.4.5.2 The advice of health workers on x-rays

A qualitative study done in Australia shows that some general practitioners (GPs) use strategies such as mentioning the dangers of x-ray exposure and the cost of x-rays as a way of dissuading patients from demanding x-ray examinations (Rogers 2002:143). Lack of systematic advice, guidelines and counseling by health care providers about medical x-ray could also be a precursor to a patient's demand for x-ray examinations. Thus, the way health staff advise the patient the first time he/she demands an x-ray could have an impact even in cases where x-rays are not requested by the doctor.

2.4.6 Social and demographic factors

Social and demographic factors are known to play a role in individuals' health-related behaviour. The socio-cultural background of the patient may also influence his/her health behaviour and consequently his/her attitude towards medical x-rays.

Patient – level variables such as sociodemographics and health status have been found to influence patient desire and expectations (Kravitz et al.2002:37). Modifying factors such as gender, age, education and cultural beliefs could also influence patient utilisation of diagnostic x-rays. In terms of the HBM demographic factors such as age and education level may influence patient demand for x-rays. A study undertaken in Canada on the pattern of diagnostic imaging utilisation shows that utilisation of diagnostic imaging increases with advancing age (Wang, Nie, Tracy, Moineddin & Upshur 2008:384).

Older patients with a low education level are more likely to demand x-ray examination. According to Boland (2006:861), demand for x-ray services in the United Kingdom continues unabated owing to an aging population.

Other than age, x-ray utilisation is also influenced by gender. Studying the pattern of diagnostic imaging utilisation, Wang et al. (2008:385) reveal that females received significantly more x-ray examinations than males.

Most patients seen in OPD at this KZN rural hospital prefer the doctor/nurse to refer them for an x-ray examination before any drug is prescribed and sometimes even after

medicine has been prescribed. Social and demographic factors could be precursors of patients demand for medical x-ray examinations. Communities with lower socioeconomic status may be exposed to conditions that expose them to common health risks. A study conducted in Canada on socioeconomic status and utilisation of diagnostic imaging indicates that poorer health status in lower socioeconomic status may disproportionately affect the use of routine radiography and ultrasound (Demeter, Reed, Lix, MacWilliam & Leslie (2005:1174). Thus socioeconomic differences may explain the utilisation of radiological examination.

Through the eyes of social cognitive theorists, it is possible that social conditions could be seen to influence health behaviour in many ways such as behavioural, psychological and physiological (Mpande, 2006:19). Other researchers have also identified societal factors as fundamental contributors that affect health behaviour (Chin, Monroe & Fiscella 2000:318). In this regard one is left to wonder about the extent the patient experiences social pressure either in demand for the x-ray or in his/her perception that the health care system encourages x-ray examination.

2.4.7 Patients knowledge of medical x-rays

Patient knowledge of x-rays is often insufficient. Surprisingly, there is very little literature on patient knowledge of medical x-rays. And yet various studies have documented deficiencies in the knowledge of medical students, doctors, dentist and paramedics about ionising radiation under which medical x-ray falls (Mubeen, Abbas and Nisar, 2008:120). One then wonders what knowledge can be expected from patients if this is the case with health professionals.

However, despite having deficiencies in x-ray knowledge, most requests of inappropriate x-ray examination by doctors have been linked to patient pressure or demand (Mendelson & Murray 2007:6). In a study conducted in Norway, general practitioners claimed that their referral behaviour was affected by patients having become better informed about their rights as patients and as such appeared increasingly demanding regarding diagnostic tests (Carlsen & Norheim 2005).

Patients' poor knowledge of x-rays at this rural KZN hospital, for instance, may account in part for the high number of patients demanding x-ray examination. Moreover, lack of knowledge has been cited as the most significant threat to the appropriate use of imaging (Bairstow et al. 2006:51). Since medical x-ray examination carries an associated health risk, unwarranted x-ray examination could further increase the risk of radiation-related consequences. A study conducted in Turkey indicates that although most of the participants were aware that x-rays are used in mammography, few knew that x-rays could be hazardous (Yùcel, Değirmenci, Acar, Ellidokuz, Albayrak & Haktanir

2005:37). It is important, therefore that patients be knowledgeable about the risks and benefits associated with medical x-ray examination to enable them to make informed decisions. In the same vein, Chesson, McKenzie and Mathers (2002:482) argue that for patients to be involved in healthcare decision-making, it is essential that attention be paid to how best to educate patients so that their knowledge is more comprehensive and reliable.

Adequate knowledge and positive attitudes alone may not be enough to ensure reduction in patient preference for x-ray diagnostic testing. However, in other health - related behaviour studies, both knowledge and attitude have been mentioned as common barriers that have been previously linked to noncompliance (Wolf, Rademaker, Bennett, Ferreira, Dolan, Davis, Medio, Liu, Lee & Fitzgibbon, 2005).

2.4.8 Patient's education level

Most researchers have identified education as the panacea for all ills (Mpande 2006:49). Patients who lack general education might lack basic knowledge about medical x-rays. To many patients health care services are complex filled with ideas about informed consent, multiple levels of decision making as well as advanced concepts that they feel inadequate to deal with. Low levels of patient education become a challenging problem to health care providers. This is because these patients may not be able to read information about medical x-rays presented in pamphlets and posters. This inability to read and understand is likely to affect their ability to make informed decisions and could also impact negatively on the awareness of the available radiological services

(modalities). A study conducted in Norway, however, showed that education and income level had little impact on radiological examination rates (Lysdahl & Børretzen 2007).

2.4.9 Public health education

A study conducted in Turkey on the knowledge and attitude of breast self-examination and mammography reveals that of 76.6% of the sample that reported ever hearing or reading about breast cancer, 39.3% mentioned television or radio as their main source of

information (Dündar, Özmen, Öztürk, Haspolat, Akyıldız, Çoban & Çakıroğlu 2006). This result highlights the importance and the role that media can play in modifying health behaviour.

Since health care providers, especially doctors and radiographers, have contact with patients, they need to develop awareness programmes on possible health risks associated with x-rays. These health promotions could involve activities aimed at improving individual and public health. If properly implemented, public health education could assist individual patients in making informed decisions when it comes to x-rays. Furthermore, Picano (2004b:849) writes that increased awareness may help reduce the number of inappropriate x-ray examinations.

For persuasive public health education campaign to be effective it must attempt to influence factors that impact on patient health behaviour. In fact, some researchers propose that to develop an effective patient education model it requires an understanding of the radiation health beliefs, attitudes and behaviour prevalent within the community (Ludwig & Turner 2002:159).

2.4.10 Availability and accessibility of x-ray services

Behaviour change, however, cannot be considered in isolation. Other factors such as availability, accessibility and cost of given health services normally have a bearing on health-related behaviour. The majority of patients in most developing countries still have no access to the most basic diagnostic imaging (Ostensen & Volodin 2000:S397). This,

however, is not the case in South Africa. In the quest to provide for the basic needs of all citizens, the South African department of health adopted a primary health care approach as was stated earlier. This, according to Thulo (2005:3) requires that radiographic services be made available at primary, secondary and tertiary centres.

Availability and accessibility of the service, thus, may be one of the factors influencing patients' demand for x-ray examinations. In fact, literature shows that availability of a given service is a well-known factor for explaining utilisation variation (Lysdahl &

Borretzen 2007). On the contrary, results from a study conducted in Norway show that better access to x-ray services does not necessarily imply increased use of plain radiography (Espeland & Baerheim 2003).

Ultrasound and conventional radiography are the only radiological modalities available at this rural KZN hospital and in fact it has been in use longer than ultrasound. A study in Turkey reveals that conventional x-ray is the most frequently used modality (Semin et al. 2006:533). This supports the notion that despite technological advances in radiology conventional radiography still remains the dominant imaging modality in many countries especially developing countries (Muhogora et al, 2008:1453). Conventional radiography is readily available and it is affordable in many rural hospitals in KZN.

2.4.11 Justification for x-ray request

Justification of a radiological test is a process of balancing the potential benefits and unnecessary radiation exposure. When there is a request for an x-ray examination it is emphasised that benefits have to override risks. This means that radiology requires that x-ray services should be determined by comprehensive clinical assessment of the patient. Relevant articles on radiation protection regulations, for instance in Greece and nations of the European Union, require that medical acts involving ionising radiation should obey two basic principles: justification and optimisation (Ch.Triantopoulou et al. 2005:306). However, because of potential benefits IRCP, for instance, does not place any restriction on exposure levels that can be used in diagnostic radiology (Wall, Kendall et al 2006: 291). Nevertheless, the IRCP still recommends justification and

optimisation of exposure in terms of expected improvement in clinical management of the patient.

Despite evidence that there is a definite potential health risk associated with x-ray examinations, there is no strong professional or legal sanction against unwarranted x-ray examination, making it easier for patients to demand it (Rogers 2002:143). Other than from the researcher's experience, it is also clear from literature that the principle of

justification for x-ray examination is not always applied in clinical practice (Ch. Triantopoulou et al. 2005:309).

2.4.12 The possible role of culture in the demand for x-ray examination

Sociocultural belief could influence patient approach and behaviour with regard to x-ray services. For instance, culture may play a central role in forming expectations of the community and in particular individual patient about potential benefits or barriers involved in having x-ray examinations.

According to Ohtska (2005:6), in a traditional situation, once an individual experiences illness, that particular individual, sometimes with the help of family, will elicit a causal explanation for his or her illness. It is at this moment that the individual may seek x-ray services. Cultural beliefs in traditional medicine and traditional healers are still rife in rural KZN. Sometimes patients do consult traditional healers before seeking the services of a medical doctor at the hospital. Tjale and de Villiers (2004:7) refer to this phenomenon as dual consultation. The decision to consult a medical doctor or a traditional one, according to these authors, depends on a number of factors namely availability of funds, availability and accessibility of the required service.

2.5 CONCLUSIONS DRAWN FROM THE LITERATURE REVIEW

The literature and the studies referred to in the above sections confirm the importance of

x-ray services. The unwarranted use of radiological imaging is also well recognised in the literature and much research has been conducted in an attempt to identify the likely cause. Most of the studies reviewed seek to generate knowledge that may be used to stem the inappropriate use of x-rays. While reviewed studies focus on the factors influencing health care workers and in particular on doctors to referring patients for radiographic tests, researchers have not been aware of service users' (patients) views (Bowling & Ebrahim 2005:535). Writing in the editorial comment Mendelson and Murray (2007:5) link patient pressure and expectation to unwarranted use of x-rays. Despite this acknowledgement, most studies have not focused on the factors that may

influence patients to demand or pressure their doctors into referring them for x-ray examination.

Literature has documented patient demand for x-rays, and other radiological services (Lysdahl & Hofman 2008:446). In order to change the unwarranted demand for radiographic services by patients which result in the inappropriate use of x-rays, a multifaceted approach which includes patients as service users is required. This approach requires sound knowledge of factors that may influence patient demand for x-ray examinations.

Following the above, there is need to conduct a research with patients themselves as respondents with the aim of understanding their perceptions, beliefs, attitudes and knowledge of x-rays. Thus, investigating and identifying factors that influence patients' demand for services like x-ray examinations from the patients' perspective is necessary hence the choice of this research topic.

2.6 CONCLUSION

There is limited or no information about factors influencing patient demand for x-ray examination among patients in South Africa and in particular in rural KZN. Although there is very little literature related to factors influencing patient demand for x-ray examination there is a lot on patient behaviour towards a number of other health-related issues. The literature, as provided above on issues related to individual health-related

behaviour towards ionising radiation in general and medical x-rays in particular, provides some form of guideline along which to focus this study. Furthermore, it brought to the fore the fact that medical x-ray services and the factors that prohibit or enhance its utilisation by the patients remain complex.

CHAPTER 3

RESEARCH DESIGN AND METHODS

3.1 INTRODUCTION

In this chapter the researcher sought to underline the main components of the descriptive cross-sectional study that was undertaken at a hospital in rural KZN. The study attempted to identify and investigate factors that influence patients' demand for medical x-rays. Furthermore chapter 3 attempts to describe the position with regard to target population and selection methods, the type of data collection instruments used and the research design used.

3.2 RESEARCH DESIGN

Research design is defined as a blueprint for a study (Burns & Grove 2005:211). A quantitative study in the form of a cross sectional survey was done. A survey, according to Polit and Beck (2008:323), is a non-experimental research design aiming to obtain information about people's preferences, attitudes and activities. Kasunic (2005:3), on the other hand, defines a survey study as a data-gathering and analysis approach in which respondents answer questions or respond to statements that were prepared in advance. The same author further states that a survey can be used to characterise the knowledge and other factors of a large group through the study of a subset of the group. Usually a

cross- sectional survey attempts to provide a snapshot of how things are at the given time at which information is collected (Denscombe 2007:7).

3.2.1 Quantitative approach

In this study, a quantitative approach was followed. Mouton (2001:152) considers that a quantitative research design gives a broad view of population through a study of a representative sample. Bowling and Ebrahim (2005:190), write that there are many quantitative methods for measuring people's psychological attributes such as preference

for a specific health service. The systematic collection of quantitative information by doing a survey was the approach employed in this study. This approach was chosen because the study aimed at quantifying factors which may influence patients' demand for x-ray examination.

3.2.2 Descriptive survey

In order to identify and describe a population phenomenon, such as factors influencing patient demand for x-ray examination, a descriptive survey study was undertaken. Bowling and Ebrahim (2005:190) are also of the view that descriptive surveys are carried out in order to describe population attributes such as knowledge, perceptions behaviour, attitudes or health aspects.

This was the essence of this study, which sought to investigate patient knowledge about x-rays, and identify factors that may influence patient demand for x-ray examinations. In resource-limited settings like a KZN rural hospital results of this survey may provide health care providers and planners with information that will help them design radiographic services and allocate scarce public health resources efficiently.

3.2.3 Advantages of a descriptive survey

The advantages of a descriptive survey study include:

- The potential of a survey to generalise to a larger population, though this is only achieved through appropriate sampling and high measurement reliability Mouton (2001:153). In this study, however, a convenient sample was used and hence the results may not be generalised.
- Another advantage of a survey study is its flexibility and broadness of scope (Polit and Beck 2008:324).
- The ability to characterise the opinions and behaviours of the population quantitatively in a way that permits uniform interpretation is key and powerful
- property (Kasunic 2005:42). In this study a questionnaire which can be

translated, adapted or used in a replicated study was used.

- A descriptive study provides valuable baseline information. This study could serve as a base for similar studies in other communities.

3.2.4 Disadvantages of survey

There are also a number of disadvantages associated with surveys. Among them:

- The failure of interviews and questionnaires to probe into such complexities as human behaviour and feelings. Thus the information derived from a survey study tends to be superficial (Polit & Beck (2008:234). This study served as a baseline and not an in-depth survey. However, a few open-ended questions were included.
- The researcher cannot infer a cause-effect relationship in a survey study. This is true but clues for cause-effect provided in this study may provide the foundation for further studies.
- Another disadvantage of a survey study is that since data collection is based on self-report respondents may intentionally misrepresent the factors in the quest to impress the researcher (Leedy & Ormrod 2005:184). This cannot be overcome, other than relying on respondents' integrity.
- Response rates are usually low. This however is associated with postal or e-mail surveys. Often, this is not the case where convenience sampling is used.

3.3 RESEARCH METHODOLOGY

3.3.1 Study population

Burns and Grove (2005:342) describe a study population as the entire set of individuals having some common characteristics. Kasunic (2005:17) believes that a study population refers to all members of a specific group. In the same vein Joubert and Katzenellenbogen (2007:94) insist that it is essential to define clearly the target population about which the researcher wants to collect information. Therefore, for the purpose of this study the target population included all patients seeking health care at the

rural KZN hospital where the researcher is employed.

3.3.2 Sampling

Terre Blanch Durrheim and Painter (2006:49) define sampling as the selection of research participants from the entire population. Sampling involves a choice between probability and non-probability. Probability sampling relies on a random selection process while non-probability sampling is distinguished by lack of random selection (Stommel and Wills 2004:300). The distinguishing characteristic which sets apart probability from non-probability sampling, according to Leedy and Ormrod (2005:199), is that the researcher can specify in advance that each segment of the population will be represented in a probability sample which is then not the case in a non-probability sample. However, practical constraints such as time, cost and the diverse nature of the population have a bearing on the sampling method and the determination of the sample size (Terre Blanche et al 2006:49).

In this study, the researcher employed a non-probability sampling procedure namely convenient sampling design. Convenient sample, according to Brink (2006:150), comprises of the most readily available or most convenient group of people.

3.3.2.1 Advantages of a convenient sampling

This method was chosen because of the following advantages:

- Its simplicity, practicality and quickness. This study is a limited scope research project and it was, therefore, appropriate to use convenient sample.
- It does not need an elaborate sampling frame.
- It was not difficult for the researcher to find participants (LoBiondo-Wood & Haber 2006:266).

In fact, Terre Blanch et al. (2006:139) write that most social sciences research relies on non-probability sampling because probability sampling approach can be

extremely expensive.

3.3.2.2 Disadvantages of convenient sample

Despite the above reasons given for choosing convenient sampling, the sample obtained using this method is not without disadvantages:

- There is a likelihood of the available subjects being atypical of the population with regard to critical variables (Polit & Beck 2008:341).
- Convenience sampling is the weakest form of sampling strategy in terms of generalisibility and evidence
- The risk of bias in a convenience sample, according to LoBiondo-Wood and Haber (2006:266), is greater than in any other type of sample.

Nevertheless, convenient sampling may be used if the study results will be unique for a particular group of individuals. Literature reveals that research conducted using a convenient sample does not estimate accurately estimate population values but rather study relationships between variables (Cozby 2004:13). This is in line with this study which sought not to generalise the results to the wider population.

3.3.2.3 Sample size

In consultation with the statistician, a sample of 110 respondents was selected from in-patients referred for x-ray examination and also from those patients in the Out-Patient Department (OPD) regardless of whether they had been referred for x-ray or not.

Inclusion and exclusion criteria were set for probable participants in the study. According to Stommels and Wills (2004:305), inclusion and exclusion criteria are a way of defining who is eligible to become a respondent and who is not.

3.3.2.4 Inclusion criteria

The eligibility criteria for the selection of research participants in this study included the following:

- The study population included all out-patients of 18 years and above either referred to the hospital's radiology department for x-ray examination or not. For many procedures with legal implications, individuals below the age of 18 are considered minors and are not required to make informed decisions
- All in-patients
- There was no upper age limit as the opinions of older patients were considered to be as worthwhile as those of younger patients
- Patients who gave consent
- Patients who could or could not read and write isiZulu or English

3.3.2.5 Exclusion criteria

Exclusion criteria is described as characteristics that a respondent may have which could affect the accuracy of the results (Brink 2006:148). Thus, in addition to the exclusion of patients younger than 18 years, the following patients were excluded:

- Patients with severe trauma and acute cases were excluded from the study. It was assumed that, in these cases, the request to undergo x-ray examination was

definitely justifiable and that they would not be in a position to make an informed decision whether to participate in the study or not. Also, their conditions might not have allowed them to answer the questionnaire.

- Patients who sought health care service at night and weekends. This was done because the research assistant was off duty during those times and the principal researcher could not speak Zulu fluently.
- Patients who did no want to take part in the study.

3.3.3 Data collection method

The research data was collected by means of a structured questionnaire. A questionnaire is defined as a list of questions which are answered by respondents either in writing or verbally (Katzenellenbogen & Joubert 2007:107). *For this study a questionnaire was designed in a way that it could also be used as a structured interview schedule.* It had to be done this way because some potential respondents could read and write and others not. It is therefore referred to interchangeably as questionnaire or interview schedule.

In studies such as cross-sectional survey, clinical trials or other epidemiological studies a questionnaire can be used as the sole research instrument (Boynton & Greenhalgh 2004:1312). Normally it is ideal to use an already validated questionnaire. Using a previously validated questionnaire will save time and resources and one is able to compare his/her own findings with other studies (Boynton & Greenhalgh 2004:1313). However, Marshall (2005:136) argues that if literature search does not yield a suitable questionnaire that can be adapted then it must be carefully planned by the researcher. Therefore, based on the literature review and in consultation with the supervisor and the statistician, the researcher developed a questionnaire. Data was collected over a period of one month.

3.3.4 The questionnaire (interview schedule)

A questionnaire, according to Williams (2003:245), can be used to gather information about patients' aspects like opinions, behaviour and other elements of a given health service. Data collection in quantitative research involves the generation of numerical data to address study objectives (Burns & Grove 2005:42). The questionnaire consisted mainly of closed or structured questions where respondents could indicate different options provided on the questionnaire. This allowed for numerical values to be assigned to responses. However, the questionnaire included opportunities for respondents to give their comments and, therefore, a few open-ended questions were included. This is in line with the beliefs of some researchers who have argue that it is good practice in a

questionnaire based on closed questions to provide space for respondents to add any explanation about their responses (Williams 2003:248).

The closed question structure, according to Denscombe (2007:166), allows for the respondents to answer from categories that have been established in advance. A ''don't know'' option was included in most response categories. The researcher included a ''don't know'' option with a view to allowing respondents to indicate that they have no opinion or have no thought on a particular item. Some of the respondents in this study may not have an opinion, as x-rays is something that they are not very familiar with. Literature search reveals that inclusion of a ''don't know'' response has been advocated by many researchers (Walonick 2004).

This questionnaire consisted among others of socio-demographic variables, and other variables based on the objectives and literature review. The questions are elaborated in Table 3.1.

3.3.4.1 Advantages of a structured data collection instrument

The researcher employed the structured data collection instrument because of the following advantages:

- When numerical values are assigned to non-numerical human behaviours such as perceived benefits they allow for uniform interpretation. Stommel & Wills (2004:163), for instance, identifies the possibility of attaching numerical values to response categories as one advantage of this type of question.
- Structured questions are easier to code.
- Another advantage of structured questions is that they are preferred by respondents who are unable to express themselves verbally (Polit & Beck 2008:415).
- The research assistant was able to read and record answers for those who could not read or write.

- Burns and Grove (2005:420) cite lack of interviewer bias and greater ease in analyzing interpreting data as some of the advantages of structured questions.
- A structured questionnaire has the ability to collect unambiguous and easy-to-count answers (Bowling & Ebrahim 2005:204).

3.3.4.2 Disadvantages of a structured questionnaire

A structured questionnaire is not without disadvantages.

- The researcher, for instance, may overlook some important issues as the responses are limited (Babbie 2007:246).
- Other researchers have pointed out the restriction of the number of possible answers as a weakness of the structured questionnaire (Bless & Higson-Smith 2000:119).

To partially overcome these disadvantages, open ended questions were included in this study.

3.3.4.3 Questionnaire layout

Questionnaire layout is not only important in ensuring that all questions are answered, but also helps in data coding and analysis (Williams 2003:248). The questionnaire consisted of an introductory letter (annexure) and two distinct sections. Section 1 dealt

with demographic data while section 2 elicited other aspects for example respondents' knowledge about medical x-rays. The layout, motivation and description of the contents of the questions are presented in Table 3.1 below. A copy of a questionnaire is attached as addendum B

Table 3.1 Questionnaire layout

SECTIONS	QUESTIONS: Description and Motivation
Section 1: Respondents' demographic characteristics	Questions 1 – 6 elicited demographic information from the respondents. The required information included the respondent's gender, age, education level, income and whether he/she had an x-ray before. The information obtained was used to describe the sample and determine the relationship between results of some of the questions and demographic data (age gender and educational level).
Section 2: Other aspects (for example knowledge about x-rays).	This section did not only consist of questions on knowledge about x-rays but also on other aspects related to x-rays. The division of questions in this section was as follows; Questions 7-8 determined if respondents were aware of x-rays and from whom did they get the information. Questions 10–13 were designed to assess the respondent's level of knowledge about x-rays. Patient awareness and knowledge of any given health service is an important factor in influencing patient behaviour towards a given service. This research aimed at determining how knowledgeable patients are regarding x-ray benefits and risks in order to enable them to make informed decisions. Questions 15-16 solicited information on the respondent's interaction with health workers who in many cases are required to refer patients for an x-ray Data obtained was used to determine whether health providers might play a role in influencing patient demand for x-rays Questions 17-21. These questions requested participants to indicate on selected aspects on what they think about x-rays. Data obtained was used to determine the sample's perception about x-rays. The patient's perceived benefits, expectations and outcome of an x-ray examination might influence these perceptions.

	Questions 22-27 elicited information about patient's belief about x-rays. It is important to determine the patient's beliefs on a given health service. Determination of individual's beliefs and values is important because the individual's behaviour is to a large extent influenced by these factors. Questions 28-33 were designed to determine possible barriers that might affect patients' demand for x-rays. Questions 9, 14 and 34 were open-ended questions and were designed to give the respondents an opportunity to provide comments or add any further explanation about selected responses.

3.3.4.4 Questionnaire language

Although standardised data collection in any type of questionnaire is encouraged, language and the anticipated variation of educational background of respondents had to be taken into consideration in this study. The questionnaire thus had to be in both English and Zulu. The translation from English and the back-translation were done by native Zulu-speaking health professionals. Some researchers have suggested that translation should be done by native speakers of a language to which the questionnaire is being translated (Francis, Eccles, Johnston, Walker, Grimshaw, Foy, Kaner, Smith & Bonetti 2004:28). The questionnaire was divided into sections, each dedicated to the variable based on study objectives and literature review. Both self reporting by respondents and face-to-face interview using the questionnaire was used as methods of administration of the questionnaire.

3.3.4.5 Research assistant

Polit and Beck (2008:382) propose that data collectors, where possible, should match study respondents in areas such as language, racial or cultural background. When selecting the research assistant, the researcher took into consideration the person's congruity with sample characteristics. A trained research assistant conducted structured face-to-face interviews with respondents who could not read and write.

3.3.4.6 Data collection procedure and administration of data collection instrument

Babbie (2007:256) identifies three methods of administering questionnaires to the respondents. These methods include:

- Self-administered questionnaire. In this method respondents are asked to complete the questionnaire themselves.
- Interviews in a face-to-face encounter using a structured questionnaire.
- Questionnaire administration is either by telephone or mail.

In this study, however, both self-reporting and structured face-to-face interviews were conducted in either the radiology department as patients came for x-ray examinations or with those participants selected from OPD. According to Joubert and Ehrlich (2007:107), in a self-administration of the instrument questions may be read out one at a time and answers filled in by a respondent in a structured manner. The advantage of structured interviews is that they can accommodate less literate respondents (Polit & Beck 2008:351). The research assistant read questions and responses one at a time and the respondent was then given an opportunity to choose the response. The chosen response was then filled in by the research assistant.

The respondents were requested to answer the questions by selecting/ticking the appropriated answer from a predetermined range of two or more options. The respondents were allowed to complete the questionnaire within the research setting. This approach according to Williams (2003:246) has two advantages:

- The researcher is able to ensure that the target respondent completes the questionnaire
- He/She is also able to clarify any ambiguous questions and ensure that the respondent answers all the questions

3.4 MEASURES TO ENSURE VALIDITY AND RELIABILITY

3.4.1 Validity

The validity of a measuring instrument is established when the instrument actually measures the concept in question and the concept is measured accurately (Delport 2005:160). Other researchers describe validity as the extent to which an instrument measures what it purports to measure (Elasy & Gaddy 1998:757). The attempt by the researcher to develop a simple and understandable questionnaire was a way of enhancing validity as the validity of a survey relies heavily on the respondents' willingness and ability to report their perceptions accurately (Stommel & Wills 2004:158).

3.4.1.1 Content validity

Content validity is described as the adequate sampling of the relevant material or content that the measuring instruments purports to measure (Rosnow & Rosenthal 2005:141). To enhance content validity the questionnaire was pre-tested on selected patients. The responses from the pre-testing sample were used to evaluate the clarity of the questions. The respondents from this group were also asked if there were areas of importance which they thought the questionnaire did not address. According to Marshall (2005:135) this relates to content validity.

The questionnaire used in this study was based on a thorough literature review and the aim was to use as much of the presented literature in the development of the questionnaire. Furthermore one may use experts in the given field, in this case radiology, to evaluate the content validity of particular questions (Stommel & Wills 2004:222). Thus in order to ascertain the instrument validity it was subjected to evaluation and proof-reading by the radiographic and nursing managers and both the radiologist and study supervisor.

Then corrections were made to areas of the questionnaire that were either ambiguous or difficult to understand by respondents. Based on the responses from the pre-testing sample and comments from the group of experts, adjustments were made to four questions. For instance, most of the pre-tested sample said that question number 10 was

not clear. Changes were made to this question accordingly. One question was removed completely.

3.4.1.2 Face validity

Face validity is the degree to which an instrument gives an appearance that it is measuring something relevant (Rosnow & Rosenthal 2005:141).This type of validity was used to determine and ensure that the questionnaire was readable and the content clear. To ensure face validity the researcher interviewed selected prospective participants, after they had completed the questionnaire. These participants were

selected randomly. The aim was to discover whether the answers they gave in the questionnaire agrees with their real opinions.

3.4.2 Reliability

Reliability, according to Delport (2005:162), is concerned with not what is being measured but how well it is being measured. Other researchers define reliability as the dependability of the measurement instrument; in other words, the extent to which the instrument provides the same results when repeated (Terre Blanche et al. 2006:152).

Therefore, in an attempt to enhance reliability the questionnaire was translated and back translated. In this study, two Zulu speakers were asked to translate the questions from English to isiZulu and two different Zulu speakers were requested to translate from isiZulu back to English.

The interviewer was also trained. The training consisted of an overview explanation of the objectives and rationale of the study context together with an in depth review of the questionnaire. The questionnaire was pre-tested on patients before the actual study to ensure reliability of data collection instruments and also to help in the identification of problems that needed correction. The researcher tried to minimise ambiguity. The format of the questions were standardised in the quest to increase reliability (Boynton & Greenhalgh 2004:1313). The anonymity of respondents was also used to increase

reliability. In this study, it was achieved through effective explanation and assurance that responses given would not be tied to any-one's name and infact respondents were instructed not to provide any personal identification information.

3.4.2.1 Acceptability

Williams (2003:249) proposes that qualitative methods can be used to test the acceptability of the questionnaire. When pre-testing the instruments, the researcher requested respondents to include comments about the questionnaire.

3.4.3 Pre-testing of instrument

Delport (2005:171) suggests that newly-constructed questionnaire must be thoroughly pre-tested before being utilised in the main study. Thus, prior to the actual study, the instrument was pre-tested on selected patients from both OPD and in-patients. This is in line with Boynton (2004:172) who is of the opinion that a questionnaire must be pre-tested on participants who are representatives of the sample. The pre-test was utilised to help assess the process and also identify problems that might be related to the questionnaire.

Apart from assisting with the problems related to the measuring instrument, the pre-testing phase also assisted with ensuring adequacy in preparation of logistics and flow of activities. For instance, the pre-testing phase revealed that receptability of most patients in OPD was dependent on the presence of doctors in the consulting rooms. Many patients argued that it was pointless answering the questions as they knew that they would subsequently not be attended to. This was despite the fact that patients were told that the study was in no way related to the absence or presence of doctors in the consulting rooms. Based on this observation, it was agreed that self-administration of questionnaires or face-to-face interviews with respondents from OPD would only be conducted when doctors were present in the consulting rooms.

3.5 DATA ANALYSIS

In order to give meaning to the collected data, a researcher must reduce and organise data by conducting data analysis (Burns & Grove 2005:63). In this study, EpiInfo version 6 was used for both data capturing and statistical analysis. Data analysis included both descriptive and inferential statistics namely chi-square for categorical variables. Denscombe (2007:253) argues that descriptive statistics if properly used can offer the researcher precise way of:

- summarising the findings
- data organization

- displaying the evidence
- exploring connections between parts of data

This argument is supported by other authors who write that the purpose of data analysis is to reduce data to an intelligible and interpretable form (Kruger, De Vos, Fouché & Venter 2005:218).

The choice of statistics was based on the fact that most of the variables measured were categorical. Cross tabulation was used to make comparisons between nominal variables, for example male and female patients. Cross tabulation also allowed the researcher to test whether the differences between subgroups within the survey were statistically significant. Cross tabulation is a popular technique used to study relationship betweens normal (categorical) or ordinal variables.

The researcher was assisted by a bio-statistician from whom a pre-coded template was received in preparation for numerical data analysis.

3.5.1 Data coding and data entry

Coding is described as a process by which questionnaire data is converted into numbers or categories (Williams 2003:249). To transform and allow data to be analysed

quantitatively, the researcher attributed a number to each piece or group of data. The statistician created a questionnaire (QES) file using EpiInfo version 6. This file served as a template for data the entry screen. The researcher then used this pre-coded template prepared by a statistician to enter data in preparation for analysis.

3.5.2 Data cleaning

After all the questionnaire responses were entered, the researcher undertook a data cleaning process. This was done in order to identify inconsistence or outliers. One of the methods used to clean data was to produce frequency figures for each question. Outliers were then identified and examined.

3.6 ETHICAL CONSIDERATIONS

Ethics is defined as the study or science of moral values or ethical principles which include beneficence, justice and autonomy (Mosby's Medical, Nursing and Allied Health Dictionary 2002:416). In view of this, the researcher took into consideration the following principles of ethics during the study.

3.6.1 Permission to conduct a study

The research proposal was submitted and permission was sought from UNISA's ethics committee. The ethics committee approved the study (see attached annexure). The ethics application was also submitted to KZN's Health and Knowledge Management through the chairman of Education Training Committee at the hospital. Permission was granted (see annexure).

3.6.2 Participants' consent

When study participants were invited to take part, adequate information about the survey was given. Oral consent was obtained before administering a questionnaire or interview.

Furthermore, it was mentioned in the covering letter that acceptance and completion of the questionnaire constituted consent by the respondent for those who could read.

3.6.3 Justice

Justice, according to Stommel and Wills (2004:377), concerns the right to privacy and fair treatment of respondents in the context of research participation. In order to protect the participants' right to privacy, all responses were collected anonymously. Anonymous data collection was used to avoid linking information to a particular respondent. The researcher achieved this through omission of identifying information such as name, address or telephone number.

3.6.4 Autonomy

The research participants have the right to full information and self determination with regard to study participation (Stommel & Wills 2004:380). The respondents were informed about the survey before being invited to participate. There after oral consent was sought. Respondents were given the option of taking part or not. Those respondents who took part were informed that they were free to discontinue at anytime. Furthermore, respondents were at liberty not to answer any question that they felt they did not want to answer.

3.6.5 Beneficence

Stommel and Wills (2004:377) describe beneficence as the principle of refraining from exploitation of research respondents and doing no harm to them. Apart from ensuring that the well-being of respondents is secured, the researcher should ensure that participants' decisions are respected (Amir Sing, Kagee & Swartz 2007:32). The researcher ensured that x-ray examinations intended for those respondents who refused to take part in the study were not interfered with. Furthermore respondents were not coerced into taking part by any means. It was also envisaged that the results of the study might be implemented in a way that could benefit the study population.

3.7 CONCLUSION

This chapter discussed the methodology used to undertake this study. This included, research design, data collection, study population, sampling and sample size, pre-testing, data analysis and ethical consideration.

CHAPTER 4

DATA ANALYSIS, INTERPRETATION AND PRESENTATION

4.1 INTRODUCTION

In this chapter the researcher discussed data analysis and interpretation. Data entry and analysis were achieved using Epi info software programme version 6. Descriptive as well as inferential statistics were used in the analysis. Results were presented in graphs or tables. Percentages were rounded off to one decimal point.

4.2 DATA ANALYSIS PROCESS

The guiding principle for the analysis of relationship between selected variables was as follows:

- The level of significance used in the data analysis of this study was 5% (0.05). This means that
  - if $p < 0.05$ the difference observed in the results is statistically significant, implying an association or a relationship between the variables analysed
  - if $p > 0.05$ the difference observed in the results is not statistically significant, implying no association or relationship between the variables analysed

4.2.1 Structured questions

Questions 1–5, 8 and 15 required information other than just ‘‘Yes’’ or ‘‘No’’ to be filled in because they included biographical data. Response alternatives of ‘‘Yes’’, ‘‘No’’ and ‘‘I don’t know’’ were applicable to all questions with the exception of questions 6, 7, 16, 18, 22, 24, 25, 29 and 33 where only ‘‘Yes’’ or ‘‘No’’ was requested as an answer. The ‘‘don’t know’’ response was included to provide an option for respondents who were unsure about answers.

During the coding process, and for the purpose of data analysis, response alternatives for questions 10–13 were recoded as ‘‘Correct’’ or ‘‘Incorrect’’. The response alternatives

for the rest of the questions in the questionnaire were not re-coded.

4.2.2 Open-ended questions

Questions 9, 14 and 34 were open-ended. These items in the questionnaire were not coded for quantitative analysis and were analysed individually under a section after the closed questions. However, in order to present them as quantitative data, respondents’ responses were grouped in themes.

4.3 PARTICIPATION RATE

The sample was selected using a convenient sampling procedure over a period of one month at different days and times of the day, except weekends. Patients were informed about the study, the aim of the study, and that participation was voluntary. A total of 110 patients was approached and all accepted and completed the questionnaire, giving a participation rate of 100%. A response rate of 100% is normally unusual and was due to some of the following reasons:

- The study was non–threatening.
- Respondents wanted to contribute, because they realised that the study might benefit the community.

- Most respondents were familiar with the research assistant because of his active involvement in community activities.
- The respondents indicated that they understood the purpose of the study very well.

4.4 RESPONDENT'S SOCIO-DEMOGRAPHIC CHARACTERISTICS

Demographic variables could be precursor to patient demand for x-ray examination. Thus, of the 34 items in the questionnaire, 6 elicited patients' socio-demographic information. Demographic variables discussed in this study included:

- Respondents' hospital status

- Respondents' gender
- Respondents' age
- Education level
- Employment status
- Reason for coming to hospital
- Had the respondent ever had an x-ray before?

4.4.1 Respondents' hospital status

An introductory (unnumbered) question determined whether respondents were in or out patients. The results are reflected in figure 4.1 below.

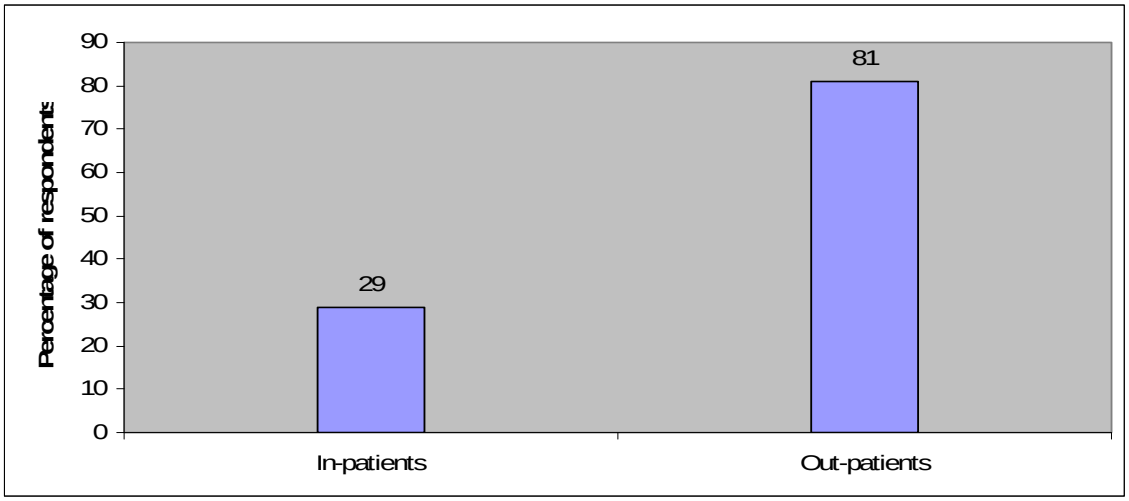

Figure 4.1 Respondents' hospital status (n=110)

The sample was drawn from both respondents seeking health care services from OPD and those who had been admitted. As shown in figure 4.1 above, the majority of the respondents 73.6% (n=81) came from OPD.

4.4.2 Question 1: Gender

Question one was set to determine respondents' gender. The gender composition of the study sample is presented in figure 4.2.

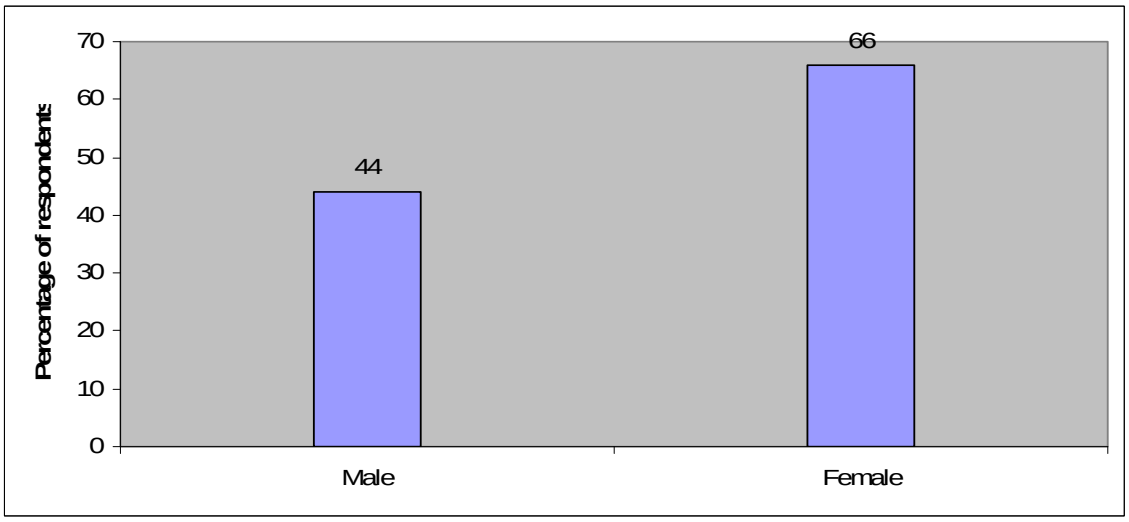

Figure 4.2 Respondents' gender (n=110)

The study sample comprised of fewer men than women representing 40% (n=44) and 60% (n=66) of the sample respectively. This is in line with the overall hospital statistics which shows that more female patients pass through the hospital than male. Other possible reasons may include:

- Men from this area could be working or looking for jobs in cities, leaving mainly women in the rural area.
- There are more women than men according to the provincial population estimate for KwaZulu-Natal of 2009 (Statistics South Africa 2009:15).

4.4.3 Question 2: Respondents' ages

Question 2 of the questionnaire was set to determine the respondents' age. The respondents' ages ranged from 18 to 85 years. The mean age was 36.5 years. For the purpose of this study respondent's age were grouped into three class interval: namely, ≤24 (youth), 25-49 (adults) and 50 and above (seniors). All ages of respondents falling into a particular class interval were then counted together. The researcher reasoned that knowledge and beliefs tends to be generational, and therefore decided on this grouping. The age distribution is presented in figure 4.3.

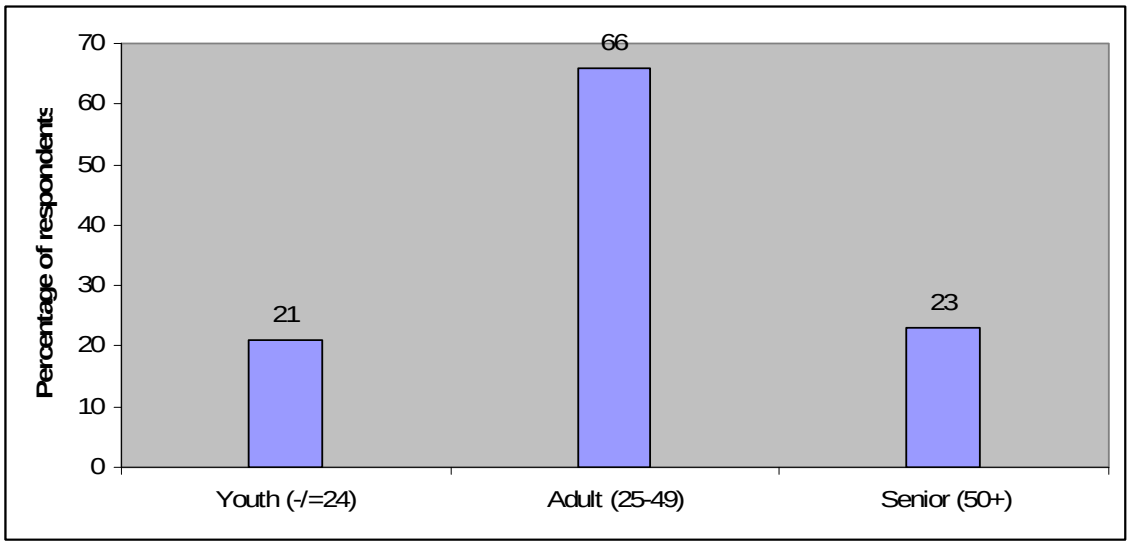

Figure 4.3 Respondents' ages (n=110)

According to figure 4.3, the highest number of respondents, 60% (n=66) was in the adult category. The lowest category was the youth representing only 19.1% (n=21) of the total sample. This may be attributed to the fact that this is a rural area. Young people are often a healthier group and this may be a reason why more adults and seniors use the rural hospital. It could also be that many of the young people work or study in the cities.

4.4.4 Question 3: Educational level

This question was set to determine respondents' level of education. For the purposes of data analysis, categories for education levels were grouped as follows; no formal education, primary school, secondary/tertiary. Because of the low number of respondents with college/university education level, they were combined with those with secondary education. There were no patients with apprentice/in-service education.

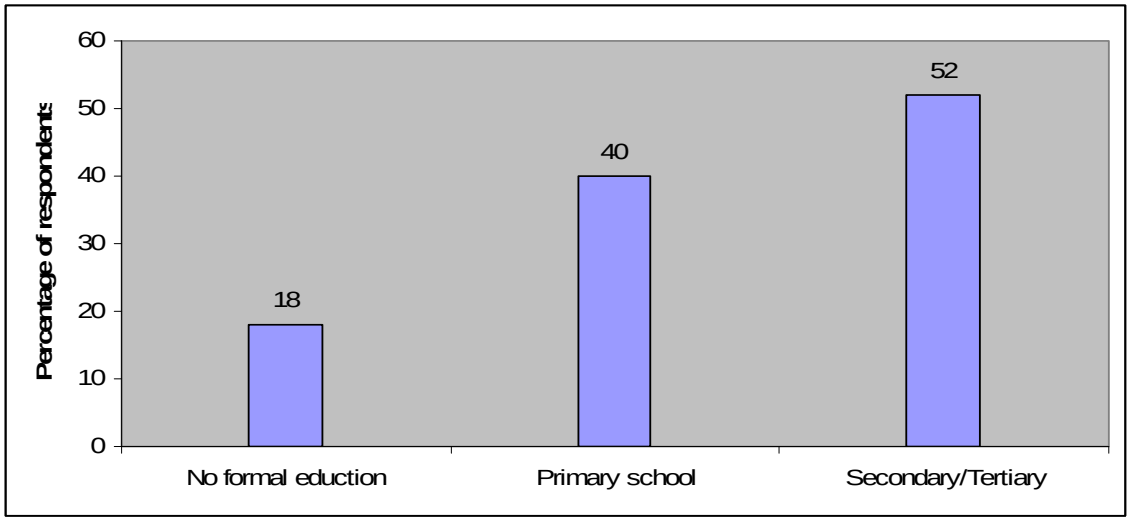

Figure 4.4 Respondents' educational level (n=110)

Of the 110 surveyed patients only 47.3% (n=52) indicated that they had secondary/tertiary education. Those with primary school education accounted for 34.4% (n=40) while 16.3 % (n=18) reported having had no formal education. This may be a reflection of the area's literacy rate.

At the national level, the basic results of a community survey of 2007 shows that percentage distribution of population aged 20 years and above with no schooling was 10.3%; those that had completed primary school 5.9%; some primary school 16.0%, 18.6% completed secondary school and some secondary 40.1% and 9.1% with tertiary education (Statistics South Africa 2007).

It was important for the researcher to determine the respondents' level of education as it might have impact on patients' understanding and consequently decision-making with regards to x-ray examination.

4.4.5 Question 4: Employment status

Question four determined the employment status of the respondents and it gave an idea of the source of income at the same time. This data was grouped into four categories namely; employed, unemployed, grant/pension and other. Because of very low number

of self-employed respondents, they were grouped with employed respondents.

Figure 4.5 Respondents' employment status (n=110)

Of the 110 respondents, 18.2 % (n=20) were employed. More than half of the respondents 54.5 % (n=60) reported that they were not employed. Pension or grants as a source of income accounted for 19.1% (n=21) while 8.2% (n=9) of the respondents fell into the ''other'' group. These were students. The high proportion of unemployed respondents may reflect the socioeconomic status of the geographical area, but this assumption needs to be validated against the source of income of the population in the whole area.

4.4.6 Question 5: Reason for visiting the hospital

In question 5 respondents were asked to select from the given options the reason that made them seek health services. The responses are reflected in figure 4.6.

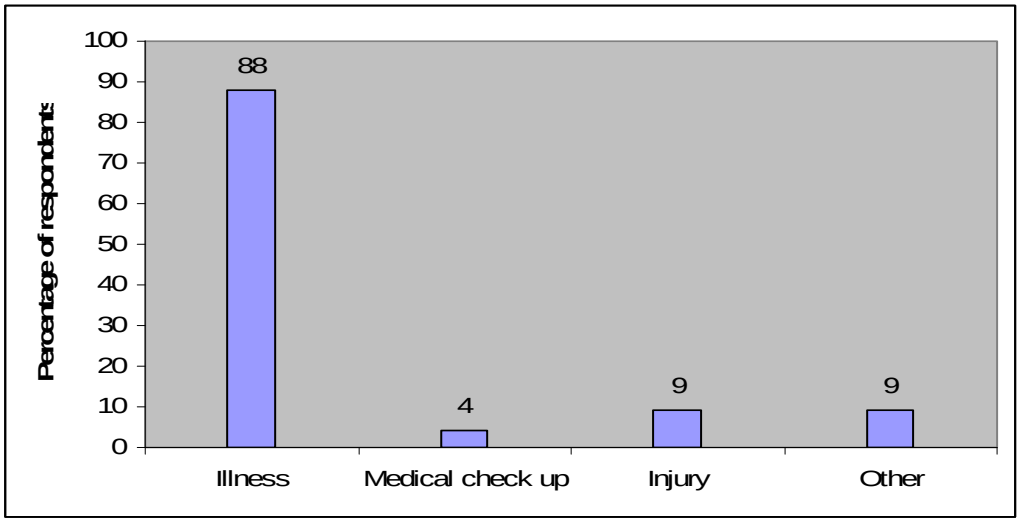

Figure 4.6 Reasons for visiting hospital (n=110)

Those who came to the hospital because of illness-related complaints accounted for 80.0% (n=88). A total of 3.6% (n=4) of respondents came for pre-employment medical check-up. Of the 110 participants 8.2% (n=9) said they sought medical care because of injury while the same number of respondents came for other reasons which included ante natal care visit and routine collection of drugs for chronic illnesses.

4.4.7 Question 6: Previous x-ray examinations.

Question 6 in the questionnaire requested respondents to state whether they have had an x-ray examination previously.

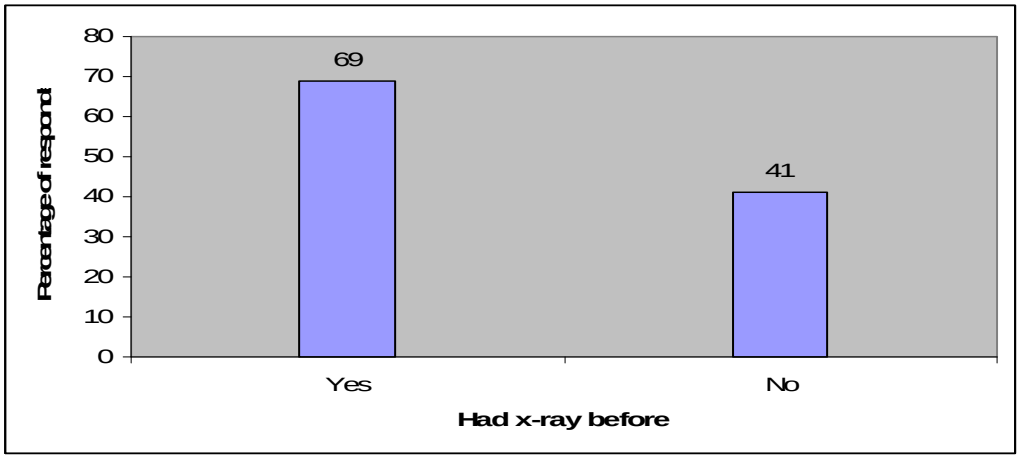

Figure 4.7 Previous x-ray examinations (n=110)

This was a dichotomous item consisting of only two possible answers ‘‘Yes’’ or ‘‘No’’. A total of 63% (n=69) of respondents indicated that they had had an x-ray examination before and the rest 37% (n=41) had never had an x-ray examination.

4.5 RESPONDENTS’ KNOWLEDGE OF MEDICAL X-RAYS

4.5.1 Introduction

The introductory part of this section comprised of two items. The first item was an open-ended question and it was designed to determine participants’ understanding of what an x-ray is. It was dealt with later with the other two open-ended questions under section

4.10. The second item asked respondents to indicate, by ticking in the box, from whom they received their information about x-rays.

4.5.2 Question 7: Awareness of x-rays before administering questionnaire

The first item under this section requested respondents to indicate whether they had ever heard about x-rays before the day of completing the questionnaire. The responses to this question are reflected in Table 4.1 below.

Table 4.1 Awareness of x-rays before day of completing questionnaire (n=106)

Respondents had heard about x-rays before	Frequency	Percentage (%)
Yes	72	67.9
No	34	32.1

According to respondents' responses, 67.9% (n=72) indicated that it was not the first time they had heard about x-rays. Thirty four respondents (32.1%) said that they had never before heard about medical x-rays. Four respondents did not answer the question, hence the total number of respondents was 106 instead of 110.

4.5.3 Question 8: Source of information

This question requested those research participants who had indicated in question 7 that they had heard about x-rays to identify the source of their information, on a given list. Table 4.2 reflects the respondents' response distribution.

It must be noted that four respondents who indicated that they had not heard about x-rays in the earlier item answered this question. The total number who answered this question was 76 instead of 72 as shown in Table 4.1 above.

Table 4.2 Source of information about x-rays (n=76)

Item		Frequency	Percentage (%)
From whom did you obtain information about x-rays	Family member	15	19.7
	Health care provider	46	60.5
	Friend	7	9.2
	Media	6	7.9
	Other	2	2.6

According to the data presented in the above table it is evident that the majority 60.5% (n=46) of respondents who confirmed that they had heard about x-rays obtained the information from health workers. Family members as a source of information about x-ray accounted for 19.7% (n=15) whereas friends and media represented 9.2% (n=7) and 7.9% (n=6) respectively. The category of ‘‘other’’ was only 2.6% (n=2) and both of them mentioned school as the source of information.

4.5.4 Questions 10 -13: Patient’s knowledge of x-rays

Respondents’ knowledge of x-rays was determined using four questions namely questions 10, 11, 12 and 13. The response alternatives were ‘‘Yes’’, ‘‘No’’ and ‘‘I don’t know’’ For the purpose of data analysis, the responses were coded as correct or incorrect. Don’t know answer was regarded as incorrect. Each correct answer carried 1 point and as such there were 4 points in total.

The knowledge score was computed by totalling the number of correct answers. Respondent’s knowledge level was then classified as follows:

- A score of 3 or 4 correct answers was regarded as good knowledge
- A score of 2 correct answers was regarded as average knowledge
- A score of 0 or 1 correct answers was regarded as poor knowledge

In a studies where knowledge is measured, experts are usually asked to determine a competency indicator against which scores of the study participants can be ‘‘measured’’. In this case, however, only a few questions were asked because the study is exploration in nature. It could be argued that four questions are a limited number of questions to use assessing patients’ knowledge. However, the four questions represent important area of

knowledge about x-rays and more advanced questions would not have been understood by this patient population. Another reason for limiting number of questions is because it was not possible to translate all technical terms into Zulu.

The classification above was then decided on, because it is in line with what is generally accepted in the school; namely, that learner usually passes with a mark of 50% (2/4) and gets a distinction with marks around 75% (3/4).

In all the items the majority of respondents could not give correct answers, indicating poor knowledge as alluded to earlier. Of 110 respondents, there were only 10.9% (n=12) of the respondents who demonstrated good knowledge about x-rays. Those with average knowledge about x-rays accounted for 15.5% (n=17) of the study sample. The majority 73.6% (n=81) of the respondents had a score of 0 or 1 and as such considered to have poor knowledge about x-rays. The respondents' responses to individual items are presented in Table 4.3 below.

Table 4.3 Survey result of x-ray knowledge (n=110)

Item	Correct	Incorrect
Question 10	26 (23.6%)	84 (76.4%)
Question 11	36 (32.7%)	74 (67.3%)
Question 12	23 (20.9%)	87 (79.1%)
Question 13	28 (25.5%)	82 (74.5%)

The responses to individual items by patients as reflected in the above table reveal an interesting conceptual knowledge of x-rays by respondents. The result that stands out is question 12 which show that 79.1% (n=87) believed that x-rays can be used to show all diseases. The remainder of the scores for the other questions fell between 67.3% and 76.4%. Of 110 respondents 74.5% (n=82) did not believe that x-rays could pose a health risk.

4.6 PERCEIVED BENEFITS AND EXPECTATIONS OF X-RAYS AND INVOLVEMENT OF HEALTH CARE PROFESSIONALS

4.6.1 Introduction

The questions that were dealt with in this section are questions 15 - 21. These questions attempted to solicit information on the respondents' interaction with health care providers regarding x-ray examination and benefits, as the patient perceived it, also formed part of these questions. The researcher argued that patients' perceived benefit and expectation of an x-ray examination outcome may influence patients' thoughts about x-rays.

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4.6.2 Question 15: Source of factual information about x-rays

In this item respondents were asked to select a source or sources, from a given list, which they thought could provide them with factual information about x-rays. No respondent indicated more than one source although the question allowed them to choose more than one source. Table 4.4 below summarises the frequency distribution of responses.

Table 4.4 Sources that can be trusted to provide proper information about x-rays (n=110)

Trusted source to provide proper information about x-rays	Frequency	Percentage (%)
Family member	13	11.8
Friend	2	1.8
Health care provider	92	83.6
TV/Radio/Newspapers(media)	2	1.8
Other	1	0.9

Table 4.4 indicates that the majority of respondents, 83.6% (n=92) would trust health care providers to provide them with factual information about x-rays. Family members as a source that could provide factual information about x-rays came in second with

11.8% (n=13) of the respondents. Friends and media as sources that could provide factual information on x-rays accounted for 1.8% (n=2) each whereas only 0.9% (n=1) of the respondents indicated school as a source of factual information about x-rays.

4.6.3 Question 16: Provision of information by health care workers before x-ray examination

Respondents were asked whether health care workers should provide information before sending the patient for an x-ray test. The results are presented in Table 4.5.

Table 4.5 Health care workers should provide information about x-rays (n=110)

Should health care workers provide information?	Frequency	Percentage (%)
Yes	102	92.7
No	8	7.3

As could be expected Table 4.5 shows that the bulk of the respondents 92.7% (n=102) were in favour of health care providers at least providing brief information about x-rays before sending a patient for a radiographic test. Of the respondent 7.3% (n=8) did not agree.

4.6.4 Question 17: Problems with doctors who did not request x-rays

This item was set to determine whether respondents had a problem with doctors who sent patients to collect medication based on clinical investigation, without x-ray examination. It assessed, therefore, whether patients regarded x-rays as essential in the investigation process. The responses to this item are presented in Table 4.6.

Table 4.6 Problem with doctor who did not request x-ray (n=110)

Problem with doctor not requesting x-ray	Frequency	Percentage (%)
Yes	46	41.8
No	64	58.2

Forty six (46) respondents representing 41.8% of the sample indicated they had a problem with a doctor who sent a patient to collect medicine without first doing an x-ray examination. The majority 58.2% (n=64) responded in the negative.

4.6.5 Question 18: Reliability of x-ray examination compared to clinical evaluation

The study respondents were requested in question 18 to indicate whether results obtained from an x-ray examination were more reliable than doctors' clinical evaluation.

Table 4.7 X-ray examination more reliable than clinical assessment (n=110)

Reliability of x-ray examination compared to a doctor's clinical assessment	Frequency	Percentage (%)
Yes	66	60.0
No	17	15.5
Don't know	27	24.5

On the issue of the reliability of x-ray examination compared to clinical evaluation, 60.0% (n=66) of the respondents answered in the affirmative. They were of the opinion that x-rays are more reliable. This shows that their perception was based on incorrect information. Of 110 respondents, only 15.5% (n=17) said that x-ray examination was not

more reliable than doctors' clinical assessment while 24.5% (n=27) of the respondents were unsure.

4.6.6 Question 19: Ability of x-rays to reveal all illnesses and source of pains

Question 19 asked respondents to indicate whether x-rays have the ability to reveal all illnesses and the source of pain. Respondents could either indicate yes (x-rays have the ability to reveal) or no (x-rays do not have the ability to reveal) or that they did not know.

Table 4.8 Ability of x-rays to reveal all illnesses and source of pain (n=110)

Ability of x-ray to reveal all illness and pain	Frequency	Percentage (%)
Yes	55	50
No	29	26.4
Don't know	26	23.6

The data presented in Table 4.9 shows that half 50% (n=55) chose the 'Yes' option. They believed that x-rays have the ability to reveal all illnesses and pain which indicates that their perceptions they are not based on correct information. Just slightly above a quarter, 26.4% (n=29), of the study sample answered 'No' which indicates that their perception was based on correct information while 23.6% (n=26) of the respondents were not sure.

4.6.7 Question 20: X-ray better than sputum test in diagnosing TB

Respondents were asked in question 20 whether x-ray examination could reveal TB better than having a sputum test. Results are presented in Table 4.9.

Table 4.9 X-ray examination better option than sputum test in diagnosing TB (n=110)

X-ray better in diagnosing TB than sputum test	Frequency	Percentage (%)
Yes	70	63.6
No	15	13.6
Don't know	25	22.7

According to Table 4.9 above, 70 respondents accounting for 63.6% of the sample answered positively. They did think that x-ray examination was a better option for diagnosing TB which indicates that the perception is based on incorrect information. Only 13.6% (n=15) answered negatively indicating that these patients are familiar with the sputum test for TB. Those who did not express an opinion accounted for 22.7% (n=25) of the sample.

4.6.8 Question 21: Ability of x-ray to reduce pain

Question 21 asked the study sample to indicate whether x-ray examination alone could reduce pain.

Table 4.10 Ability of x-ray to reduce pain (n=110)

X-rays have the ability to reduce pain	Frequency	Percentage (%)
Yes	19	17.3
No	69	62.7
Don't know	22	20.0

The majority of the respondents, 69 (62.7%), answered this question negatively; they knew that x-ray examination would not reduce pain. A fairly small percentage (17.3%) answered positively which suggests that their perception was based on incorrect information. They thought that x-ray could reduce pain. The data in Table 4.10 also shows that 22 respondents representing 20% of the sample were not sure whether x-rays had the ability to reduce pain or not.

4. 7 PATIENTS' BELIEFS

4.7.1 Introduction

Kasunic (2005:37) describes beliefs as the assessment of what individuals think about certain issues and they are not necessarily based on facts. Instead of true or false, the responses to the six items in this section were coded as ''Yes'' ''No'' or ''Don't know''.

4.7.2 Question 22: All individuals involved in an accident should be sent for x-ray.

Respondents were asked if all individuals involved in an accident should be sent for an x-ray regardless of their condition. Results are presented in Table 4.11

Table 4.11 All individuals involved in an accident should be sent for x-ray (n=110)

All individuals involved in accident to be sent for x-ray	Frequency	Percentage (%)
Yes	77	70.0
No	14	12.7
Don't know	19	17.3

According to the data presented in the table above, the majority 70.0% (n=77), of the sample chose the incorrect answer. They believed that all who were involved in an accident should be sent for an x-ray examination regardless of their clinical condition. Only 12.7% (n=14) of the respondents answered negatively which means that they did not believe that all those involved in an accident should be sent for an x-ray examination. Respondents who were unsure accounted for 17.3% (n=19).

4.7.3 Question 23: Consultation with a traditional healer first for a child with a swollen elbow

Respondents were asked if they would consult a traditional healer first in the case of a child with a swollen elbow. Results of this question are reflected in Table 4.12.

Table 4.12 Child with a swollen elbow: consultation with a traditional healer (n=110)

Traditional healer to be consulted first if child comes home with a swollen elbow	Frequency	Percentage (%)
Yes	10	9.1
No	100	90.9

Almost all respondents, 90.9% (n=100) answered this question negatively. Only 9.1% (n=10) indicated that they would consult a traditional healer first.

4.7.4 Question 24: Child with swollen elbow should be taken for an x-ray

In this question the researcher wanted to determine whether respondents would take a child with a swollen elbow to the hospital for an x-ray. Results are reflected in Table 4.13.

Table 4.13 Child with swollen elbow should be taken for an x-ray (n=110)

Child with swollen elbow to be taken for x-ray	Frequency	Percentage (%)
Yes	105	95.5
No	5	4.5

Almost all respondents, 95.5% (n=105) said they would take a child to the hospital for an x-ray. Just 4.5% (n=5) said they would not do so.

4.7.5 Question 25: Detection by a traditional healer of a bone fracture that cannot be detected by x-ray.

Respondents were asked if they believed that a traditional healer could reveal a bone fracture that could not be detected by an x-ray. Table 4.14 reflects the results.

Table 4.14 Detection by traditional healer of a bone fracture that cannot be detected by x-ray (n=110)

Ability of traditional healer to reveal a bone fracture that cannot be detected by x-ray	Frequency	Percentage (%)
Yes	5	4.5
No	99	90.0
Don't know	6	5.5

Of the 110 respondents surveyed, 90.0% (n=99) of the total sample did not believe that a traditional healer could reveal a bone fracture that an x-ray failed to detect. Five respondents, representing 4.5% of the study sample, believed that a traditional healer was capable of revealing a bone fracture that was undetectable by x-ray.

4.7.6 Question 26: All coughing patients should request an x-ray

Respondents were asked if they believed that all patients coughing should ask for an x-ray examination when they went to the hospital. Respondents' responses are presented in Table 4.15 below.

Table 4.15 All coughing patients should ask for an x-ray (n=110)

All coughing patients should ask for an x-ray	Frequency	Percentage (%)
Yes	71	64.5
No	14	12.7
Don't know	25	22.7

Interesting responses to this question were received. The majority 64.5% (n=71) believed that all patients coughing should ask for an x-ray while only 12.7% did not believe that this was necessary. Just under a quarter of respondents 22.7% (n=25) did not express an opinion.

4.7.7 Question 27: Ability of a doctor to treat properly without x-ray

This item was set to find out from respondents if they believed that a doctor could treat a patient properly without an x-ray. Responses are reflected in Table 4.16

Table 4.16 Can a patient be treated properly without x-ray? (n=110)

Doctor able to treat patient properly without x-ray	Frequency	Percentage (%)
Yes	29	26.4
No	60	54.5
Don't know	21	19.1

Most of the sample 54.5% (n=60) did not agree that a doctor could treat a patient properly without an x-ray. Just above a quarter of the respondents 26.4% (n=29) believed that a patient could receive proper treatment without an x-ray.

4.8 EXPLORATION OF BARRIERS TO THE USE OF X-RAY SERVICES

4.8.1 Introduction

The items presented in this section were designed to attempt to determine whether some of the problems and barriers in the provision of x-ray services might affect patients' demand for x-rays. The respondents were asked to tick ''Yes'', ''No'' or ''I don't know'', the last option was included to cater for respondents who were unsure.

4.8.2 Question 28: Willingness to undergo x-ray examination even if it was painful

Question 28 was set to determine whether respondents would still be willing to be x-rayed if they were informed that undergoing x-ray examination would be painful.

Table 4.17 Willingness to undergo x-ray examination if patient was informed of its being painful (n=110)

Willingness to be x-rayed if aware of its being painful	Frequency	Percentage (%)
Yes	76	69.1
No	34	30.9

Interestingly, more than two thirds of respondents; namely, 69.1% (n=76) said they were willing to be x-rayed even after being told that the x-ray examination was painful and only 30.9% (n=34) answered negatively.

4.8.3 Question 29: Cost of x-ray investigation

This item in the questionnaire asked the respondents to indicate whether they perceived x-ray examination to be expensive or not. Results are presented in Table 4.18.

Table 4.18 Opinion of cost of undergoing x-ray investigation (n=110)

Having an x-ray examination is expensive	Frequency	Percentage (%)
Yes	9	8.2
No	71	64.5
Don't know	30	27.3

Of the 110 respondents, only nine (8.2%) indicated that they believed that x-ray examination was expensive. More than half, 64.5% (n=71), of the surveyed sample were of the opinion that having an x-ray was not expensive and 27.3% (n=30) were undecided.

4.8.4 Question 30: The influence of information about x-rays on decision to make

use of x-ray examination

Respondents were asked if having adequate information about x-rays would affect their decision to make use of x-rays. Responses are summarised in Table 4.19.

Table 4.19 Influence of information on decision making regarding x-ray examination (n=110)

Influence of adequate information regarding x-rays on decision	Frequency	Percentage (%)
Yes	44	40.0
No	32	29.1
Don't know	30	30.9

Responding to this question, of 110 respondents, 40.0% (n=44) agreed that adequate information about x-rays would affect their decision whether to make use of it whereas 29.1% (n=32) indicated that their decision would not be affected. Just under a third 30.9% (n=30) were uncertain.

4.8.5 Question 31: Influence of accessibility on the use of x-rays.

Question 31 centred on the accessibility of x-ray services because some patients were referred from other clinics for the sole purpose of having an x-ray. Respondents were

asked if they would make use of an x-ray service if it was more accessible.

Table 4.20 Use of x-ray service when made more accessible (n=110)

Use of x-ray services if they were more accessible	Frequency	Percentage (%)
Yes	85	77.3
No	14	12.7
Don't know	11	10.0

Data in Table 4.20 reveals that the majority of the respondents, 77.3% (n=85) said that they would make use of the x-ray service if it was more accessible and 12.7% (n=14) answered negatively in this case. A small percentage of the respondents 10% (n=11) did not know whether they would make use of x-ray services if they were more accessible.

4.8.6 Question 32: Willingness to undergo x-ray examination in light of receiving health risk related information.

This question was set to determine whether respondents would still be willing to be x-rayed if they knew that there was a health risk associated with the x-ray examination. Results for this item are reflected in Table 4.21

Table 4.21 Willingness to undergo x-ray examination if patient is aware of health risk (n=110)

Willingness to be x- rayed if aware of a health risk	Frequency	Percentage (%)
Yes	56	50.9
No	44	40.0
Don't know	10	9.1

According to the responses in this study to question 32, 50.9% (n=56) answered positively when asked whether they would still be willing to be x-rayed if they knew that there was a health risk associated with the examination. A sizeable number of the sample 40% (n=44) of the sample, answered negatively.

4.8.7 Question 33: Willingness to be x-rayed at extra cost

The last item discussed in this section inquired whether respondents would still be willing to be x-rayed if they were required to pay extra.

Table 4.22 Willingness to be x-rayed at extra cost (n=110)

Willing to be x- rayed if extra costs are involved	Frequency	Percentage (%)
Yes	72	65.5
No	38	34.5

Nearly two thirds of the respondents; namely, 65.5% (n=72) said they were willing to make extra payment for x-rays while 34.5% (n=38) were either not willing or were unable pay extra.

4.9 CROSS TABULATION BETWEEN SOCIODEMOGRAPHIC VARIABLES, NAMELY GENDER, AGE AND EDUCATIONAL LEVEL AND QUESTIONS RELATED TO KNOWLEDGE, PERCEIVED BENEFITS AND BELIEFS

4.9.1 Introduction

Cross tabulation between socio-demographic variables, namely gender, age and educational level, and questions related to knowledge, perceived benefits and beliefs was done. By examining these frequencies, the researcher was able to identify relationships between cross tabulated variables. Gender, age and educational level were selected because of the likelihood of the influence it could have on the respondents' health-related behaviour and could therefore be used in making recommendations. Although in section 4.5.4 questions 10-13 were discussed collectively, it could not be done in this section, because each respondent's score was not available individually in order to cross tabulate. It may further be an advantage to be aware of the specific knowledge areas that would need special attention for each group.

4.9.2 Cross tabulation between gender, age and knowledge-related question

In this section, respondents' gender, age and educational levels were cross-tabulated with questions 7 and the group of questions 10-13.

4.9.2.1 Gender and awareness of x-rays before completing the questionnaire

The results of question 7 were cross tabulated with respondents' gender. Results are reflected in Table 4.23.

Table 4.23 Relation between gender and awareness of x-rays

Sociodemographic variable		Question 7				(χ^2)	p-value
		Yes		No			
Gender	Female	42	(65.6%)	22	(34.4%)	0.39	0.533
	Male	30	(71.4%)	12	(28.6%)		

The results in the table above show that there was not a significant difference between male and female respondents. This means that respondents' gender did not have an effect on their awareness of x-rays.

4.9.2.2 Age and awareness of x-rays before day of completing questionnaire

The results of question 7 were cross-tabulated with respondents' age groups. Table 4.24 shows the results.

Table 4.24 Relation between respondents' age and awareness of x-rays

Sociodemographic variable		Question 7				(χ^2)	p-value
		Yes		No			
Age group	Youth	13	(61.9%)	8	(38.1%)	1.28	0.528
	Adults	42	(66.7%)	21	(33.3%)		
	Seniors	17	(77.3%)	5	(22.7%)		

The results reveal that there was not a significant difference between the different age groups in the study and awareness of x-rays.

4.9.2.3 Educational level and awareness of x-rays before completing questionnaire

The results of question 7 were cross tabulated with respondents' educational level and it is reflected in Table 4.25. Two respondents from each group, primary and secondary/tertiary skipped the question.

Table 4.25 Relation between educational level and awareness of x-rays.

Sociodemographic variable		Question 7				(χ^2)	p-value
		Yes		No			
Educatio	No formal	10	(55.6%)	8	(44.4%)		

n level	**Primary**	28 (73.7%)	10 (26.3%)	1.84	0.398
	Sec/Tertiary	34 (68.0%)	16 (32.0%)		

There was not a significant difference between the different educational level groups and respondents' awareness of x-rays. This means that respondents' educational level did not have influence on the awareness of x-rays.

4.9.2.4 Question 10 and respondents' gender

The results of question 10 was cross-tabulated with respondents' gender and is reflected in Table 4.26

Table 4.26 Relation between gender and knowledge of whether x-ray alone could prevent diseases

Sociodemographic variable		**Question 10**		(χ^2)	**p-value**
		Correct	**Incorrect**		
Gender	**Female**	17 (25.8%)	49 (74.2%)	0.41	0.523
	Male	9 (20.5%)	35 (79.5%)		

There was not a significant difference between respondents' gender and their knowledge of whether x-ray alone could prevent disease. This means that respondents' gender had no influence on whether they believed x-rays alone could prevent disease.

4.9.2.5 Question 10 and respondents' age

The results of question 10 were cross tabulated with respondents' age groups and are reflected in Table 4.27.

Table 4.27 Relation between respondents' age and knowledge of whether x-ray alone can prevent diseases

Sociodemographic variable		**Question 10**		(χ^2)	**p-value**
		Correct	**Incorrect**		
Age group	**Youth**	5 (23.8%)	16 (76.2%)	3.82	0.148
	Adults	19 (28.8%)	47 (71.2%)		

	Seniors	2 (8.7%)	21 (91.3%)		

There was not a significant difference between the different age groups and knowledge of whether x-ray alone could prevent disease. This means that age had no influence on the knowledge of whether x-ray alone could prevent diseases.

4.9.2.6 Question 10 and respondents' educational level

The results of question 10 were cross tabulated with respondents' level of education and are reflected in Table 4.28.

Table 4.28 Relation between educational level and knowledge of whether x-ray alone could prevent diseases

Sociodemographic variable		**Question 10**		**(χ^2)**	**p-value**
		Correct	**Incorrect**		
Education-al level	**No formal**	1 (5.6%)	17 ((94.4%)	7.57	0.023
	Primary	7 (17.5%)	33 (82.5%)		
	Sec/Tertiary	18 (34.6%)	34 (65.4%)		

There was a significant difference between respondents' educational level and knowledge of whether x-ray alone could prevent diseases. The results show that only 5.6% of respondents with no formal education answered correctly. This means that less of respondents with an advanced educational level selected incorrect answer, in this case that x-ray alone could prevent disease.

4.9.2.7 Question 11 and respondents' gender

The results of question 11 were cross tabulated with respondents' gender and are reflected in Table 4.29

Table 4.29 Relation between gender and knowledge of whether x-ray alone could prevent injuries

Sociodemographic variable		**Question 11**		**(χ^2)**	**p-value**
		Correct	**Incorrect**		
Gender	**Female**	22 (33.3%)	44 (66.7%)	0.03	0.869
	Male	14 (31.8%)	30 (68.2%)		

There was not a significant difference observed which means that respondents' gender did not have an influence on the knowledge of whether x-ray alone could prevent injuries.

4.9.2.8 Question 11 and respondents' age

The results of question 11 were cross tabulated with respondents' age groups and are reflected in Table 4.30 were obtained.

Table 4.30 Relation between age and knowledge of whether x-ray alone could prevent injuries

Sociodemographic variable		Question 11		(χ^2)	p-value
		Correct	Incorrect		
Age group	Youth	6 (28.6%)	15 (71.4%)	1.02	0.599
	Adults	24 (36.4%)	42 (63.6%)		
	Seniors	6 (26.1%)	17 (73.9%)		

The results in the above table show that there was not a significant difference between the respondents' age group and knowledge of whether x-ray alone could prevent injuries. This means that age had no influence on this area of knowledge.

4.9.2.9 Question 11 and respondents' educational level

The results of question 11 and respondents' educational level were cross tabulated and are reflected in Table 4.31.

Table 4.31 Relation between educational level and knowledge of whether x-ray alone could prevent injuries

Sociodemographic variable		Question 11		(χ^2)	p-value
		Correct	Incorrect		
Education	No formal	3 (16.7%)	15 ((83.3%)		

level	**Primary**	11 (27.5%)	29 (72.5%)	4.77	0.092
	Sec/Tertiary	22 (42.3%)	30 (57.7%)		

Results in Table 4.31 show that there was not a significant difference between the three educational level groups in terms of knowing whether x-ray alone could prevent injuries.

4.9.2.10 Question 12 and respondents' gender

Results of question 12 were cross tabulated with respondents' gender are reflected in Table 4.32.

Table 4.32 Relation between respondents' gender and knowledge of whether x-ray could be used to reveal all diseases

Sociodemographic variable		**Question 12**		**(χ^2)**	**p-value**
		Correct	**Incorrect**		
Gender	**Female**	16 (24.2%)	50 (75.6%)	1.10	0.294
	Male	7 (15.9%)	37 (84.1%)		

There was no significant difference between the two groups. This means that gender had no influence on knowledge regarding the use of to identify all diseases.

4.9.2.11 Question 12 and respondents' age

The results of question 12 cross-tabulated with respondents' age are reflected in Table 4.33

Table 4.33 Relation between respondents' age and knowledge of whether x-ray could be used to reveal all diseases

Sociodemographic variable		**Question 12**		**(χ^2)**	**p-value**
		Correct	**Incorrect**		
	Youth	3 (14.3%)	18 (85.7%)		

Age group	**Adults**	18 (27.3%)	48 (72.7%)	4.25	0.119
	Seniors	2 (8.7%)	21 (91.3%)		

The results indicate that there was not a significant difference between respondents' age groups and knowledge regarding the use of x-rays to identify all diseases. Respondents' age appeared to have no influence on this area of knowledge.

4.9.2.12 Question 12 and respondents' educational level

Results of question 12 cross tabulated with respondents' educational level are reflected in Table 4.34.

Table 4.34 Relation between respondents' educational level and knowledge of whether x-ray could be used to reveal all diseases

Sociodemographic variable		**Question 12**		**(χ^2)**	**p-value**
		Correct	**Incorrect**		
Education level	**No formal**	4 (22.2%)	14 ((77.8%)	0.17	0.919
	Primary	9 (22.5%)	31 (77.5%)		
	Sec/Tertiary	10 (19.2%)	42 (80.8%)		

Results in Table 4.34 shows that there was not a significant difference between respondents' educational level and knowledge regarding the use of x-ray identify. Respondents' educational level appears to have no influence on knowledge regarding x-rays' ability to show all diseases.

4.9.2.13 Question 13 and respondents' gender

The results of question 13 were cross tabulated with respondents' gender and are reflected in Table 4.35.

Table 4.35 Relation between respondents' gender and knowledge regarding x-rays being associated health risk

Sociodemographic variable		**Question 13**		**(χ^2)**	**p-value**
		Correct	**Incorrect**		
	Female	18 (27.2%)	48 (72.8%)		

Gender	**Male**	10 (22.7%)	34 (77.3%)	0.28	0.594

According to data presented in the table above there was not a significant difference between the two groups in terms of knowledge of x-rays being associated with health risks.

4.9.2.14 Question 13 and respondents' age

The results of question 13 were cross-tabulated with respondents' age groups and results are reflected in Table 4.36.

Table 4.36 Relation between respondents' age and knowledge regarding x-rays being associated with health risks

Sociodemographic variable		**Question 13**		**(χ^2)**	**p-value**
		Correct	**Incorrect**		
Age group	**Youth**	2 (9.5%)	19 (90.5%)	4.38	0.112
	Adults	21 (31.8%)	45 (68.2%)		
	Seniors	5 (21.7%)	18 (78.3%)		

There was not a significant difference between respondents' age group and knowledge regarding x-rays being associated with health risks, which means that age did not have an effect on this area of knowledge.

4.9.2.15 Question 13 and respondents' level of education

The results of question 13 were cross tabulated with respondents' educational level and are presented in Table 4.37.

Table 4.37 Relation between respondents' educational level and knowledge regarding x-rays being associated health risks

Sociodemographic variable	**Question 13**		**(χ^2)**	**p-value**
	Correct	**Incorrect**		

Educa-tional level	**No formal**	7 (38.9%)	11 (61.1%)	4.33	0.115
	Primary	6 (15.0%)	34 (85.0%)		
	Sec/Tertiary	15 (28.8%)	37 (71.2%)		

Results from the above table reveal that there was not a significant difference between educational level of the respondent and knowledge regarding x-rays' being associated with health risks. Educational level therefore did not have an effect in this regard

4.9.3 Cross tabulation between gender, age and educational level and questions related to perceived benefits of x-ray examinations

In this section, respondents' gender, age and educational level was cross-tabulated with results of questions 18-21. These questions were related to perceived benefits and expectations of x-ray examinations.

4.9.3.1 Cross tabulation between respondents' gender and question 18

The results of question 18 were cross tabulated with gender and are reflected in Table 4.38.

Table 4.38 Relation between respondents' gender and reliability of x-ray examination compared to clinical assessment by doctor

Sociodemographic variables		**Question 18**			**(χ^2)**	**p-value**
		Yes	**No**	**I don't know**		
Gender	**Female**	36 (54.5%)	12 (18.2%)	18 (27.3%)	2.11	0.347
	Male	30 (68.2%)	5 (11.4%)	9 (20.4%)		

The results show that there was not a significant difference between respondents' gender and the perception that x-ray examination was more reliable than to clinical assessment done by the doctor.

4.9.3.2 Cross tabulation between respondents' age and question 18

The results of question 18 were cross tabulated with the age groups of respondents and are represented in table 4.39.

Table 4.39 Relationship between respondents' age and reliability of x-ray examination compared to clinical assessment done by doctor

Sociodemagraphic variable		Question 18			(χ^2)	P-value
		Yes	No	I don't know		
Age group	Youth (≤24)	9 (42.9%)	2 (9.5%)	10 (47.6%)	9.70	0.045
	Adult (25-49)	4 (66.6%)	12 (18.2%)	10 (15.2%)		
	Senior (50+)	13 (57.0%)	3 (13.0%)	7 (30.0%)		

According to the data presented in the table above, there was a significant difference between the respondents' age groups and the perception that x-ray examination was more reliable than doctors' clinical assessments. The expectation of the majority of adults (66.6%) and senior respondents (57%) are that x-ray examination is more reliable than a clinical evaluation by a doctor. This, however, is not the case with the younger respondents.

4.9.3.3 Cross tabulation between respondents' educational level and question 18

The results of question 18 were cross tabulated with respondents' educational level and are reflected in Table 4.40.

Table 4.40 Relation between respondents' educational level and reliability of x-ray examination compared to clinical assessment by doctor

Sociodemographic	Question 18	(χ^2)	P-value

variable						
		Yes	No	I don't know		
Edu Level	No formal ed	14 (77.8%)	1 (5.6%)	3 (16.6%)	6.43	0.169
	Primary	26 (65.0%)	4 (10.0)	10 (25.0%)		
	Sec/Tertiary	26 (50.0%)	12 (23.0%)	14 (27.0%)		

There was not a significant difference between the respondents' educational level and the expectation that an x-ray examination was more reliable than a doctor's clinical evaluation.

4.9.3.4 Cross tabulation between respondents' gender and question 19

Respondents' gender was cross tabulated with the results of question 19. The results are reflected in Table 4.41 below.

Table 4.41 Relation between respondents' gender and ability of x-rays examination to reveal all illnesses and source of pain

Sociodemographic variables		Question 19			(χ^2)	p-value
		Yes	No	I don't know		
Gender	Female	29 (44.0%)	21 (31.8%)	16 (24.2%)	3.10	0.212
	Male	26 (59.1%)	8 (18.2%)	10 (22.7%)		

The results in the above table show that there was not a significant difference between respondents' gender and expectation that x-rays were capable of revealing all illnesses and pain.

4.9.3.5 Cross tabulation between respondents' age and question 19

Respondents' age groups were cross tabulated with the results of question 19. Table 4.42 reflects the results.

Table 4.42 Relation between respondents' age and ability of x-rays to reveal all illnesses and source of pain

Sociodemographic	Question 19	(χ^2)	P-value

variable						
		Yes	No	I don't know		
Age group	Youth (≤24)	9 (42.9%)	5 (23.8%)	7 (33.3%)	3.72	0.444
	Adult (25-49)	31 (47.0%)	19 (28.8%)	16 (24.2%)		
	Senior (50+)	15 (65.2%)	5 (21.7%)	3 (13.1%)		

There was not a significant difference between respondents' age and expectation that x-rays have the ability to reveal all illnesses and pain.

4.9.3.6 Cross tabulation between respondents' educational level and question 19

Results of question 19 were cross tabulated with respondents' educational level and are reflected in Table 4.43.

Table 4.43 Relation between respondents' educational level and ability of x-rays to reveal all illnesses and pain

Sociodemographic variable		Question 19			(χ^2)	P-value
		Yes	No	I don't know		
Edu Level	No formal ed	12 (66.7%)	2 (11.1%)	4 (22.2%)	4.15	0.38
	Primary	21 (52.5%)	10 (25.0%)	9 (22.5%)		
	Sec/Tertiary	22 (42.3%)	17 (32.7%)	13 (25.0%)		

Data shows that there was not a significant relationship between respondents' educational level and the expectation that x-rays have the ability to reveal all illness and pain.

4.9.3.7 Cross tabulation between respondents' gender and question 20

Respondents' gender was cross tabulated with the results of question 20 in an attempt to observe possible relationships.

Table 4.44 Relations between gender and perception of x-ray as a better diagnostic tool for TB than sputum test

Sociodemograph-ic variables		Question 20			(χ^2)	p-value
		Yes	No	I don't know		
Gender	Female	39 (59.1%)	10 (15.2%)	17 (25.7%)	1.48	0.477
	Male	31 (70.5%)	5 (11.4%)	8 (18.1%)		

Data in Table 4.44 indicates that there was not a significant difference between respondents' gender and the perception that x-ray examination was better than sputum tests in diagnosing TB.

4.9.3.8 Cross tabulation between respondents' age and question 20

Cross tabulation was done between respondents' age group and the results of question 20. Results are presented in Table 4.45.

Table 4.45 Relations between respondents' age group and perception of x-ray as a better diagnostic tool for TB than sputum test

Sociodemagraphic variable		Question 20			(χ^2)	P-value
		Yes	No	I don't know		
Age group	Youth (≤24)	10 (47.6%)	5 (23.8%)	6 (28.6%)	3.72	0.445
	Adult (25-49)	44 (66.7%)	7 (10.6%)	15 (22.7%)		
	Senior (50+)	16 (69.6%)	3 (13.0%)	4 (17.4%)		

Results reveal that there was not a significant difference between respondents' age and the perception that x-ray examination was better than a sputum test in diagnosing TB.

4.9.3.9 Cross tabulation between respondents' educational level and question 20

Cross tabulation was done between respondents' educational level and the results of question 20. The pattern in Table 4.46 emerged.

Table 4.46 Relations between respondents' educational level and perception of x-ray as a better diagnostic tool for TB than sputum test

Sociodemographic variable		Question 20			(χ^2)	P-value
		Yes	No	I don't know		
Edu Level	No formal ed	15 (83.3%)	1 (5.6%)	2 (11.1%)	10	0.038
	Primary	26 (65.0%)	2 (5.0%)	12 (30.0%)		
	Sec/Tertiary	29 (55.8%)	12 23.1%)	11 (21.1%)		

Data in the above table shows that there was a significant difference between respondents' age and the perception that x-ray examination was better than a sputum test in diagnosing TB. The less advanced the respondents' level of education was, the stronger the perception and expectation that through x-ray TB can be diagnosed well than with a sputum test.

4.9.3.10 Cross tabulation between respondents' gender and question 21

The results of question 21 were cross tabulated with respondents' gender and are reflected in Table 4.47.

Table 4.47 Relations between respondents' gender and ability of x-ray to reduce pain

Sociodemographic variables		Question 21			(χ^2)	p-value
		Yes	No	I don't know		
Gender	Female	13 (19.7%)	42 (63.6%)	11 (16.7%)	1.50	0.472
	Male	6 (13.6%)	27 (61.4%)	11 (25.0%)		

There was not a significant difference between respondents' gender and the perception that x-ray examination has the ability to reduce pain.

4.9.3.11 Cross tabulation between respondents' age and question 21

The results of question 21 were cross tabulated with the respondents' age groups and are presented in Table 4.48.

Table 4.48 Relations between respondents' age groups and ability of x-ray to reduce pain

Sociodemagraphic variable		Question 21			(χ^2)	P-value
		Yes	No	don't know		
Age group	Youth (≤24)	3 (14.3%)	12 (57.1%)	6 (28.6%)	1.97	0.741
	Adult (25-49)	11 (16.7%)	44 (66.6%)	11 (16.7%)		
	Senior (50+)	5 (21.7%)	13 (56.6%)	5 (21.7%)		

Table 4.48 shows that there was not a significant difference between the respondents from different age groups and the expectation that x-rays have the ability to reduce pain.

4.9.3.12 Cross tabulation between respondents' educational level and question 21

Respondents' educational level was cross tabulated with the results of question 21. Results are reflected in Table 4.49.

Table 4.49 Relations between respondents' educational level and ability of x-ray to reduce pain

Sociodemographic variable		Question 21			(χ^2)	P-value
		Yes	No	I don't know		
Edu Level	No formal ed	7 (38.9%)	5 (27.8%)	6 (33.3%)	14.55	0.005
	Primary	5 (12.5%)	25 (62.5%)	10 (25.0%)		
	Sec/Tertiary	7 (13.5%)	39 (75.0%)	6 (11.5%)		

Data in the above table reveals a significant difference between respondents' educational level and the perception of the ability of x-rays to reduce pain. The less advanced the respondents' level of education was, the stronger the belief was that x-ray can reduce pain.

4.9.4 Cross tabulation between gender, age and questions related to patient beliefs about x-rays

In this section, respondents' sociodemographic variables namely, gender, age and educational level, were cross-tabulated with questions 22-27 which were related to patients' beliefs about x-rays.

4.9.4.1 Cross tabulation between respondents' gender and question 22

Respondents' gender was cross tabulated with results from question 22. The pattern in Table 4.50 emerged.

Table 4.50 Relation between respondents' gender and whether all patients involved in an accident should be sent for x-ray

Sociodemographic variables		Question 22			(χ^2)	p-value
		Yes	No	I don't know		
Gender	Female	47 (71.2%)	8 (12.1%)	11 (16.7%)	0.12	0.943
	Male	30 (68.2%)	6 (13.6%)	8 (18.2%)		

There was not a significant difference between gender and the belief that all patients involved in an accident should be sent for any x-ray examination regardless of the condition.

4.9.4.2 Cross tabulation between respondents' age and question 22

The results of question 22 were cross tabulated with the respondents' age groups and are reflected in Table 4.51.

Table 4.51 Relation between respondents' age and whether all patients involved in an accident should be sent for x-ray

Sociodemagraphic variable		Question 22			(χ^2)	P-value
		Yes	No	I don't know		
Age group	Youth (≤24)	14 (66.7%)	2 (9.5%)	5 (23.8%)	2.96	0.564
	Adult (25-49)	44 (66.7%)	10 (15.2%)	12 (18.1%)		
	Senior (50+)	19 82.6%)	2 (8.7%)	2 (8.7%)		

There was not a significant difference between the respondents' ages and the belief that all patients involved in an accident should be sent for an x-ray irrespective of their clinical condition.

4.9.4.3 Cross tabulation between respondents' educational level and question 22

Results from question 22 were cross tabulated with respondents' educational level. The following results as reflected in Table 4.52 were obtained.

Table 4.52 Relation between respondents' educational level and whether all patients involved in an accident should be sent for x-ray

Sociodemographic variable		**Question 22**			**(χ^2)**	**P-value**
		Yes	**No**	**I don't know**		
Edu Level	**No formal ed**	12 (66.7%)	1 (5.6%)	5 (27.7%)	2.46	0.651
	Primary	29 (72.5%)	5 (12.5%)	6 (15.0%)		
	Sec/Tertiary	36 (69.2%)	8 (15.4%)	8 (15.4%)		

Data in the table above gives an indication that there was no significant difference between respondents' educational level and the belief that all patients involved in an accident should be sent for an x-ray examination regardless of their clinical condition. The majority of respondents irrespective of educational level believed that all patients involved in an accident should be sent for an x-ray.

4.9.4.4 Cross tabulation between respondents' gender and question 23

Results from question 23 were cross tabulated with respondents' gender and are presented in Table 4.53.

Table 4.53 Relation between respondents' gender and consultation with traditional healer for child with swollen elbow.

Sociodemographic	**Question 23**		

variable		Yes	No	(χ^2)	p-value
Gender	Female	5 (7.6%)	61 (92.4%)	0.45	0.500
	Male	5 (11.4%)	39 (88.6%)		

There was not a significant difference between the respondents' gender and their belief that a traditional healer should be consulted for a child with swollen elbow.

4.9.4.5 Cross tabulation between respondents' age and question 23

The results of question 23 were cross tabulated with respondents' age group and are reflected in Table 4.54

Table 4.54 Relation between respondents' age and consultation with traditional healer for child with swollen elbow.

Sociodemographic variable		Question 23		(χ^2)	p-value
		Yes	No		
Age group	Youth	1 (4.8%)	20 (95.2%)	2.58	0.275
	Adults	5 (7.6%)	61 (92.4%)		
	Seniors	4 (17.4%)	19 (82.6%)		

The results give an indication that there was not a significant difference between the respondents' age and their belief that a traditional healer should be consulted for a child with a swollen elbow.

4.9.4.6 Cross tabulation between respondents' educational level and question 23

The results of question 23 were cross tabulated with respondents' educational level and are reflected in Table 4.55.

Table 4.55 Relation between respondents' educational level and consultation with traditional healer for child with swollen elbow.

Sociodemographic variable		Question 23		(χ^2)	p-value
		Yes	No		
Education level	No formal	3 (16.7%)	15 ((83.3%)	1.98	0.370
	Primary	4 (10.0%)	36 (90.0%)		
	Sec/Tertiary	3 (5.8%)	49 (94.2%)		

According to results in the table above, there was not a significant difference between the respondents' educational level and their belief that a traditional healer should be consulted for a child with a swollen elbow

4.9.4.7 Cross tabulation between respondents' gender and question 24

The results of question 24 were cross tabulated with respondents' gender and are reflected in Table 4.56.

Table 4.56 Relation between respondents' gender and taking child with swollen elbow for an x-ray

Sociodemographic variable		Question 24		(χ^2)	p-value
		Yes	No		
Gender	Female	63 (95.6%)	3 (4.4%)	0.00	1.00
	Male	42 (95.5%)	2 (4.5%)		

Data in Table 4.56 reveals that there was not a significant difference between the two groups and the belief that it was important to take a child with a swollen elbow for an x-ray.

4.9.4.8 Cross tabulation between respondents' age and question 24

The results of question 24 were cross tabulated with respondents' age groups and are presented in Table 4.57.

Table 4.57 Relation between respondents' age group and taking a child with a swollen elbow for an x-ray

Sociodemographic variable		Question 24		(χ^2)	p-value
		Yes	No		
Age group	Youth	19 (90.5%)	2 (9.5%)	3.51	0.172
	Adults	65 (98.4%)	1 (1.6%)		
	Seniors	21 (91.3%)	2 (8.7%)		

Results give an indication that there was not a significant relation between the respondents' age groups and the belief that it was important to take a child with a swollen elbow for x-ray.

4.9.4.9 Cross tabulation between respondents' educational level and question 24

Results of question 24 were cross tabulated with respondents' educational level and are presented in Table 4.58.

Table 4.58 Relation between respondents' educational level and taking a child with a swollen elbow for an x-ray

Sociodemographic variable		Question 24		(χ^2)	p-value
		Yes	No		
Education level	No formal	16 (88.9%)	2 ((11.1%)	2.23	0.327
	Primary	39 (97.5%)	1 (2.5%)		
	Sec/Tertiary	50 (96.2%)	2 (3.8%)		

Data reflects that there was not a significant difference between the respondents' educational level and the belief that it was important to take a child with a swollen elbow for an x-ray.

4.9.4.10 Cross tabulation between respondents' gender and question 25

The results of question 25 were cross tabulated with the respondents' gender and are presented in Table 4.59.

Table 4.59 Relation between respondents' gender and traditional healer's detection of a bone fracture that cannot be detected by x-ray

Sociodemographic variables		Question 25			(χ^2)	p-value
		Yes	No	I don't know		
Gender	Female	4 (6.1%)	59 (89.4%)	3 (4.5%)	1.09	0.579
	Male	1 (2.3%)	4 (90.9%)	3 (6.8%)		

Results in Table 4.59 show that there was not a significant difference between the respondents' gender and the belief that a traditional healer can detect a bone fracture that is undetectable by x-ray.

4.9.4.11 Cross tabulation between respondents' age and question 25

The results of question 25 were cross tabulated with respondents' age groups and are reflected in Table 4.60.

Table 4.60 Relation between respondents' age and traditional healer's detection of a bone fracture that cannot be detected by x-ray

Sociodemographic variable		Question 25			(χ^2)	P-value
		Yes	No	I don't know		
Age group	Youth (≤24)	3 (14.3%)	17 (81.0%)	1 (4.7%)	9.43	0.051
	Adult (25-49)	1 (1.5%)	63 (95.5%)	2 (3.0%)		
	Senior (50+)	1 (4.3%)	19 (82.6%)	3 (13.1%)		

There was not a significant difference between the respondents' age groups and the belief that a traditional healer can reveal a bone fracture that is an detected with an x-ray.

4.9.4.12 Cross tabulation between respondents' educational level and question 25

The results of question 25 were cross tabulated with respondents' educational level and are reflected in Table 4.61.

Table 4.61 Relation between respondents' educational level and traditional healer's detection of a bone fracture that cannot be detected by x-ray

Sociodemographic variable		Question 25			(χ^2)	P-value
		Yes	No	I don't know		
Edu Level	No formal ed	0 (0.0%)	15 (83.3%)	3 (16.7%)	8.52	0.074
	Primary	2 (5.0%)	35 (87.5%)	3 (7.5%)		
	Sec/Tertiary	3 (5.8%)	49 (94.2%)	0 (0.0%)		

There was not a significant difference between the respondents' educational level and the belief that a traditional healer can reveal a bone fracture that is undetectable with an x-ray.

4.9.4.13 Cross tabulation between respondents' gender and question 26

The results of question 26 were cross tabulated with respondents' gender and are reflected in Table 4.62.

Table 4.62 Relation between respondents' gender and whether all coughing patients should ask for an x-ray

Sociodemographic variables		Question 26			(χ^2)	p-value
		Yes	No	I don't know		
Gender	Female	38 (57.6%)	11 (16.7%)	17 (25.7%)	3.92	0.140
	Male	38 (75.0%)	3 (6.8%)	8. (18.2%)		

Data in the above table gives an indication that there was not a significant difference between gender and the belief that all patients who are coughing must ask for any x-ray.

4.9.4.14 Cross tabulation between respondents' age and question 26

The results of question 26 were cross tabulated with respondents' age groups and are reflected in Table 4.63.

Table 4.63 Relation between respondents' age and whether all coughing patients should ask for an x-ray

Sociodemographic variable		Question 26			(χ^2)	P-value
		Yes	No	I don't know		
Age group	Youth (≤24)	9 (42.9%)	1 (4.7%)	11 (52.3%)	14.32	0.006
	Adult (25-49)	44 (66.6%)	10 (15.2%)	12 (18.2%)		
	Senior (50+)	18 (78.3%)	3 (13.0%)	2 (8.7%)		

Data reveals a significant difference between respondents' age group and the belief that all coughing patients must ask for an x-ray. More respondents in the senior group answered in the affirmative than respondents in the younger age groups. This means that age has influence regarding this area.

4.9.4.15 Cross tabulation between respondents' educational level and question 26

The results of question 26 were cross tabulated with respondents' educational level and are reflected in Table 4.64.

Table 4.64 Relation between respondents' educational level and whether all coughing patients should ask for an x-ray

Sociodemographic variable		Question 26			(χ^2)	P-value
		Yes	No	I don't know		
Edu Level	No formal ed	14 (77.8%)	0	4 (22.2%)	3.84	0.428
	Primary	26 (65.0%)	5 (12.5%)	9 (22.5%)		
	Sec/Tertiary	31 (59.6%)	9 (17.3%)	12 (23.1%)		

Data reveals that there was not a significant difference between respondents' educational level and the belief that all coughing patients should ask for an x-ray examination.

4.9.4.16 Cross tabulation between respondents' gender and question 27

Respondents' gender was cross tabulated with the results of question 27. Results are reflected in Table 4.65.

Table 4.65 Relation between respondents' gender and belief in a doctor's ability to treat properly without x-ray

Sociodemographic variables		Question 27			(χ^2)	p-value
		Yes	**No**	**I don't know**		
Gender	Female	22 (33.3%)	32 (48.3%)	12 (18.4%)	4.22	0.121
	Male	7 (15.9%)	28 (63.6%)	9 (28.5%)		

Results in the above table reveal that there was not a significant difference between the two groups and the belief in the ability of a doctor to treat properly without an x-ray.

4.9.4.17 Cross tabulation between respondents' age and question 27

Respondents' age group were cross tabulated with the results of question 27 and are reflected in Table 4.66.

Table 4.66 Relation between respondents' ages and belief in a doctor's ability to treat properly without x-ray.

Sociodemographic variable		Question 27			(χ^2)	P-value
		Yes	**No**	**I don't know**		
Age group	**Youth (≤24)**	6 (28.6%)	9 (42.8%)	6 (28.6%)	2.71	0.607
	Adult (25-49)	18 (27.3%)	36 (54.5%)	12 (18.2%)		
	Senior (50+)	5 (21.7%)	15 (65.2%)	3 (13.1%)		

There was not a significant difference between respondents' ages and their belief in the ability of a doctor to treat properly without the use of x-ray.

4.9.4.18 Cross tabulation between respondents' educational level and question 27

The respondents' educational levels were cross tabulated with the results of question 27 and are presented Table 4.67

Table 4.67 Relation between respondents' educational level and belief in a doctor's ability to treat properly without x-ray

Sociodemographic variable		Question 27			(χ^2)	P-value
		Yes	No	I don't know		
Edu Level	No formal ed	3 (16.7%)	11 (61.1%)	4 (22.2%)	1.16	0.885
	Primary	11 (27.5%)	21 (52.5%)	8 (20.0%)		
	Sec/Tertiary	15 (28.8%)	28 (53.8%)	9 (17.4%)		

Data reveals that there was not a significant difference between the respondents' educational levels and their belief in the ability of a doctor to treat properly without an x-ray.

4.10 ANALYSIS OF OPEN ENDED QUESTIONS

4.10.1 Introduction

As alluded to in the introduction of this chapter, three open-ended questions; namely, questions 9, 14 and 34, were included in the questionnaire. These questions were included to allow for answers that the researcher could not for see. At the same time it made provision for respondents to be spontaneous while presenting their perceptions, beliefs, explanations, comments and viewpoints about the topic that is being researched (Struwig & Stead 2001:92).

Viewpoints, comments and answers given by respondents in response to open-ended questions were analysed and then organised into thematic categories. These were further used in the discussion to support results obtained from structured questions.

4.10.2 Question 9: Understanding of x-rays

In question 9 respondents were asked to explain their understanding of what an x-ray is. Twenty five (25) respondents did not answer the question at all. The researcher got the impression that they did not have the words or knowledge to describe this phenomenon.

Thirteen of the respondents did give an answer by saying that they don't know. This number (13), when added to the 25 respondents who did not answer the question at all accounts for 34.5% (n=38) of respondents of the total study population. From this observation one can therefore state that slightly above one third of the respondents in this study do not know what x-rays are.

Explanations given by the remaining 65.6% (n=72) respondents about their understanding were grouped together in themes as shown in Table 4.68.

Table 4.68 Understanding of x-rays: themes

THEME	Frequency	Percentage
X-ray check inside body	23	32.0%
X-ray show TB/fracture	24	33.3%
Purpose of x-ray	17	23.6%
Fair idea of what x-ray is	8	11.1%
Total	**72**	**100%**

Almost all respondents regardless of age and educational level were unable to differentiate between what an x-rays is and what it does. To them it seemed to be one and the same concept. Out of the 72 respondents who gave responded to question 9 33.3% (n=24) of respondents responses linked x-ray with TB and fracture investigations. Respondents often referred to x-rays as equipment used to check TB. *''X-ray is used to know if I have TB''*, was the typical comment of one of the respondents. Another respondent said, *''X-ray is done on those who are injured or those suspected to have TB''*. This link of x-ray and TB investigation by

patients, may be due to the fact that until recently x-rays were used on a regular basis as a screening tool for TB and consequently some patients still view it in that way.

Another group of respondents' answers centred around the purpose of the x-ray investigations, 32.0% (n=23) indicated that it was used to check inside the human body. One typical answer was, *''If I have injured myself x-ray will show if the bone inside my*

body is broken''. Closely related to this answer is another group of respondents, namely, 23.6% (n=17) who linked a specific detailed purpose to the understanding of x-rays. An example from the data in this regard is, *''purpose x-ray test is to help doctors to see if I have any health problem''*.

Only 11.1% (n=8) of the respondents' comments showed a fairly good idea of what x-ray is, namely that.

4.10.3 Question 14: Information obtained from x-ray examination

Question 14 required respondents to state or describe their perception of the information that doctors/nurses gain from x-ray examinations. Thirty (30) respondents either said they did not know or did not answer the question at all. This is alarming 27.3% of the respondents.

Those who answered the question gave various answers. The answers were categorised in themes as reflected in Table 4.69. As was clear from the previous section 4.10.2, respondents' understanding of what x-ray is, was perceived as what it could do for them. Therefore, there was overlapping and similarities in the response/comments to this question (14) and the previous question (9).

Table 4.69 Information obtained from x-ray examination: themes

Themes	Frequency	Percentage
X-ray provides information and explanation about patients' disease or injury	39	48.7%
Get information about TB and other chest problems	5	6.3%
Get information about health problem		

which they can't see with eyes	22	27.5%
Information that assists in treatment of patients	8	10.0%
Information about how well you are	6	7.5%
Total	80	100%

The highest percentage 48.7%, representing 39 respondents perceived x-rays as something that provides information and an explanation for illness or injury. When undergoing an x-ray examination, the patient believes that the cause of his or her ill health will be explained. For instance, one patient said, *''X-ray is going to show what is causing the pain or disease inside my body''.*

Another theme which attracted a high number of respondents accounting for 27.5% (n=22) was that in which respondents said that x-ray was important because it provided doctors with hidden information that a naked eye could not see. *''X-ray sees what is causing pain which eyes have failed to see''* said one respondent.

The other three themes were identified also indicated an awareness of information will point to a specific diagnosis or wellness which is an absence of disease. In general it appeared that the respondents were more or less aware of the purpose an x-ray examination.

4.10.4 Question 34: Knowing about x-rays

Question 34 was set to solicit from the respondents what they would like to know about x-ray. Eighty-eight (88) answered the question. Answers/comments were grouped in categories which are reflected in Table 4.70.

Table 4.70 Knowledge required about x-rays: themes

Theme	Frequency	Percentage
Know more about how x-ray works and whether there are risks	18	20.5%
Health workers should communicate x-ray		

results	43	48.9%
Doctors should explain how they are able to see problems on an x-ray	9	10.2
Ability of x-ray	14	15.9%
Cost of x-ray	4	4.5%
Total	88	100%

A theme that accounted by far the highest percentage of respondents 48.9% (n=43) was the need for health workers to communicate the results of x-ray examination. *''I would like to know if I have TB after taking x-ray'',* one respondent said. Of the 88 respondents, 20.5% (n=18) wanted to know more about how the x-ray works and whether there any health risks involved. For instance one of respondents said, *''I would like to know how x-rays see inside my body and its dangers and side effects''.*

The other group of respondents, 15.9% (n=14), wanted to know the ability of x-ray. Under this theme, some respondents wanted to know how accurate an x-ray is in revealing diseases and if it can make them feel fine. ''*I wish to know how accurate an x-ray is and if it can make me feel okay'',* was one typical comment from one of the respondent.

Technicalities like how the doctors are able to see or identify problems on an x-ray accounted for 10.2% (n=9) of the responses. The cost of x-rays concerned the least of respondents, accounting for 4.5% (n=4) of respondents who answered this question.

It is therefore interesting to note that the respondents were not so much concerned about information on what an x-ray is, how it works and the cost of x-ray examinations but rather interested in what is relevant for them namely their diagnosis. It seems also that there might be lack of communication between health workers and patients.

From this section, however, one could make the assumption that the questionnaire in itself made the respondents think about factors like risks and costs of x-ray examination that would not have been significant to them previously. Despite the fact that most patients would demand an x-ray examination, the comments suggested that they would do so without understanding the outcome.

4.11 CONCLUSION

This chapter discussed data analysis and interpretation with the help of bar charts, frequency distribution, tables and description. The analysis was based on 110 respondents (100% response rate).

In chapter 5, the researcher discusses the study findings, limitations and recommendations.

CHAPTER 5

DISCUSSION, LIMITATIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The unwarranted use of radiological imaging is well recognised and much research has been done internationally in an attempt to identify the likely cause. However, although the problem of patient demand for x-ray examination may be a commonplace in South Africa and in rural KZN in particular, available literature in the context of this study is scarce. Unwarranted demand for x-ray examination by patients must be a major concern to health care authorities and providers because of:

- the risk associated with radiation
- the likely undue pressure it may exert on hospital's financial and other health care resources

With the possibly serious consequences of inappropriate use of x-ray services by patients, there was a perceived need to investigate the likely cause. Consequently the aim of this study was to describe sociodemographic factors that might influence patient demand for x-ray examinations. Understanding factors that might play a role in the patient behaviour towards medical x-rays could be a fundamental need when formulating strategies to reduce unnecessary x-ray examinations in future. Accordingly, the objectives of this study were as follows:

- The first objective of this study was to attempt to identify the social demographic characteristics of patients who might prefer x-ray examination. This objective was met by cross tabulation between sociodemographic variables: namely, gender, age and educational level and questions related to perceived benefits and beliefs. The assumption for the selection of gender, age and educational level was because of the likelihood that these factors could influence respondents' health-related behaviour and could be used in making recommendations.
- The second objective was to determine the patients' level of knowledge of x-rays. This objective was met by means of data analysis of questions specifically

formulated for this purpose as presented in section 4.5 of chapter 4. Open ended questions also brought insight into this area of study.

- The third objective was to identify factors other than sociodemographic that might influence patients' demand for x-ray examinations in rural KZN. This was

done in order to highlight factors other than patients' sociodemographic circumstances that might influence their behaviour regarding x-rays. This was achieved through the use of specific questions and the analysis thereof as reflected in sections 4.6, 4.7 and 4.10 of chapter 4.

5.2 STUDY FINDINGS

Results of a qualitative study conducted in Norway on concerns regarding rational decisions in general practice revealed that general practitioners blamed patient demand for diagnostic tests on patients being better informed about their rights (Carlsen & Norheim 2005). Other factors, however, seem to play a role in this context which differ from the study done in Norway, a developed western country.

5.2.1 Respondents' sociodemographic factors

The only areas where significant differences were found between sociodemographic factors and areas covered in the questionnaire were:

- Subsection 4.9.2.6: There was a significant difference between respondents' levels of education and knowledge regarding x-ray prevention against disease. The results show that only 5.6% of the respondent with no formal education answered correctly, while less of the respondents with advanced educational level selected incorrect answer.
- Subsection 4.9.3.2: A significant difference was evident between respondents' ages and the perception that x-ray examinations were more reliable than a clinical assessment by a doctor. The majority of adults (66.6%), and senior respondents (57.0%) were of the perception that x-ray examination was more reliable than a clinical evaluation by a doctor. This however was not the case with the younger respondents.

- Subsection 4.9.3.9: There was a significant difference between respondents' educational level and the perception that x-ray was a better diagnostic tool for TB than a sputum test. The less advanced the respondents' educational level

was, the stronger the perception and expectation that through x-ray TB can be diagnosed well than with a sputum test.

- Subsection 4.9.3.12: A significant difference was evident between respondents' educational levels and the perceptions of the ability of x-rays to reduce pain. The less advanced the respondents educational level was, the stronger the belief that x-ray could reduce pain
- Subsection 4.9.4.14: There was a significant difference between respondents' age groups and the belief that all coughing patients must request an x-ray. More respondents (78.3%) in the senior group answered in the affirmative than respondents in the younger group.

Sociodemographic factors, therefore, manifested in few cases. This is discussed further below

5.2.1.1 Influence of gender

There were more women than men in the study sample. Previous studies on the influence of gender on the utilisations of radiology found that females underwent x-ray examination more than males (Wang et al. 2008:385). Many factors could contribute to this situation, for example, women coming for routine mammography examinations. Because no significant difference was found between the gender groups, it seemed as if gender did not have an influence on demand or preferences for x-ray examination.

5.2.1.2 Influence of age

Demographic variables such as age have been found to influence patients' health seeking behaviour in general and it also applies to this study. There was a relationship between respondents' age groups and the reliance on x-ray examination rather than on doctors' clinical assessments. Analysis of data revealed that the majority of respondents

in the adult (66.6%) and senior (57.0%) age groups perceived x-ray examination to be more reliable than a doctor's clinical evaluation. Furthermore, the majority of respondents in the senior group (78.3%) indicated that all coughing patients should ask for an x-ray examination which also differed significantly from other age groups.

This trend might be linked to the fact that respondents in this study, which was done in a rural context, the older age groups were more likely to be less educated. Evidence from literature suggest increased utilisation of diagnostic imaging with advancing age (Wang et al. 2008:384; Boland 2006:861)

5.2.1.3 Influence of education level

The results of this study indicated that the respondents' educational level might have an influence on patient demand for x-ray examination. The study results reveal that there was a significant relationship between educational level and knowledge regarding x-ray as prevention against disease. Almost all of the respondents with no formal education (94.4%) believed that x-ray alone could prevent disease.

A significant difference was also found when the respondent's educational levels were considered against the perception of the ability of x-ray to help reduce pain. A higher percentage of respondents with secondary/tertiary level of education (75.0%) believed that x-ray cannot help reduce pain.

Results of this study further indicated that respondents educational level had influence on the perception that x-ray was a better diagnostic tool for TB than sputum test. It was found that the less advanced the respondents' educational level was, the stronger the perception and expectation that through x-ray TB could be diagnosed better than a sputum test.

Education thus may have an impact on patient behaviour regarding x-ray examination. Even though higher education level might have an effect on patients making an informed choice for x-ray examination, the overall result from this study suggests, however, that

this was not the case. It may not enhance a rational decision with regard to x-ray examination because there were a few significant differences where education had influence. This observation is similar to that of a study done in Norway which revealed that education had little impact on x-ray examination rates (Lysdahl & Børretzen 2007).

5.2.2 Level of x-ray knowledge

General radiography (x-ray) has been in use for a fairly long period of time at this hospital. It was therefore expected that many patients would have knowledge about it. On the contrary, the study revealed that very few patients 10.9% (n=12) had knowledge of x-rays despite the fact that 62.9% (n=72) of the respondents reported that they have heard about x-rays before. The quantitative results are further supported by qualitative responses emanating from open-ended questions. Of 72 respondents who attempted question 9, only 11.1% (n=8) seemed to have a fair idea of what an x-ray was.

Poor knowledge about x-ray examination clearly has an implication on the patient's ability to make an informed decision. Evidence from literature suggests that lack of knowledge is the most significant threat to unwarranted demand for radiographic imaging ((Bairstow, et al. 2006:51). Moreover, current emphasis, according to Chesson et al. (2002:481), is placed on the issue of consent for x-ray examination.

If patients are not knowledgeable about the health service they are seeking their decision-making ability is compromised. It is for this reason that attention is paid to the best manner in which to educate patients if they are to be involved in decisions with regard to x-ray examination and health care in general (Chesson et al. 2002:482). It is the responsibility of health care workers to respond emphatically to patient demand for unnecessary x-ray examinations because patient demand is part of daily clinical encounters as was experienced by the researcher.

This study showed that the majority of respondents (60.5%) who indicated that they had heard about x-rays before obtained information from health care providers. Only 19.7%

obtained it from family members and 9.2% from friends (subsection 4.5.3, question 8).This contradicts the results of a study done by Chesson, et al. (2002:481) which asserted that the majority of study participants (72.0%) obtained information about x-

rays from family and friends. It is alarming that the mass communication media was obviously not a source of this kind of information.

5.2.3 Other factors that may influence patients' demand for x-ray in rural KZN

The results from this study further suggest that there are a number of factors apart from sociodemographic factors that might influence patients' demand for x-ray in rural KZN. These include:

5.2.3.1 Perceived benefit of x-rays

The likelihood of patient demand for x-ray service, according to Lyon and Reeves (2006:284), is possibly dependent on the balance between perceived benefits and barriers that may prevent the intended action. Perceived benefits, expectation and beliefs may considerably influence patient demand for x-rays and consequently impact on the appropriate use. The HBM postulates that for one to adopt a behaviour there should be benefits that will result from undertaking the action (Ludwig & Turner 2002:159).

This study shows that patient perceptions and expectations might influence patient demand for unwarranted x-ray examinations. For instance, results indicated that 50% of the respondents agreed that x-ray had the ability to reveal all illnesses and pain (subsection 4.6.6, question 19). These results were supported by comments made by most respondents (48.7%) who answered question 14. The comments suggested that patients seeking health care services at this rural KZN hospital believed that x-rays could provide information and an explanation for their illnesses or injuries. This observation supports the results from a Norwegian study on patients' views on the importance and usefulness of conventional or plain radiography which found that patients thought conventional radiography was needed to rule out serious diseases (Espeland et al. 2001:1359).

There is a clear link between the discussion above and the following subsection (5.2.3.2).

5.2.3.2 Reliability of x-rays

This study demonstrated that 60% of the surveyed patients appeared to believe in the reliability of the x-rays more than a doctor's clinical investigation. Only 15.5% of the surveyed sample said x-ray was not more reliable than doctor's clinical evaluation (subsection 4.6.5, question 18). Furthermore, 54.5% of the respondents did not believe that a doctor could treat a patient properly without an x-ray (subsection 4.7.7, question 27). The results were further collaborated by the comments made by 27.5% of the respondents who, in their answers to question 14 commented that x-ray examination was important because it provided hidden information that could not be seen by the naked eye. These findings are supported by Espeland et al (2001:1360) who assert that some patients consider plain radiography to be more reliable than clinical evaluation.

This finding actually exposes patients' ignorance about the ability and weaknesses of x-rays as a diagnostic tool. This may be one of the factors impacting on most patients' decisions on whether to demand x-ray or not. This result further exposes the likelihood of ineffective health information dissemination, despite the fact that it is essential for patients to have thorough information to enable them make an informed decision (Mitchell 2003:31).

5.2.3.3 Beliefs

The responses in this survey implied that patients' perceptions and behaviour concerning medical x-rays were based on beliefs and expectations which emanated from inadequate information and lack of knowledge. One would, therefore, expect conflict between modern technology and traditional medicine in a rural setting. Surprisingly, the results showed that the majority of respondents believed more strongly in the abilities of x-rays than in traditional healers. When asked where they would take a child with a swollen elbow, the majority of the respondents (95.5%) said they would take the child to the

hospital for an x-ray instead of a traditional healer (subsection 4.7.4, question 24).

The belief in the usefulness of x-rays as a diagnostic tool is so strong that only 12.7% of

the study sample believed that there was no need for patients involved in an accident to be sent for an x-ray, even though clinical practices dictates that each case should be considered on the basis of need (subsection 4.7.2, question 22).

Furthermore, the study noted that the majority of the respondents (64.5%) believed that all patients coughing should request for an x-ray. The high number of respondents who had faith in x-ray imaging in this study was, however, in sharp contrast to the results from a study conducted by Werner and Gross (2009:76) which revealed increased skepticism towards x-rays among the public and health-care providers. It should, however, be noted that the context of Werner and Gross's study was in an area where advanced technology is freely available and has been for a long period.

5.2.3.4 Lack of information

According to Joubert and Ehrlich (2007:188), patient health behaviour may be influenced by knowledge and availability of health education campaigns associated with it. The researcher is not aware of any health educational campaigns related to x-ray examination in the study context or elsewhere in South Africa. Unlike in developed countries where patients have some information about and opinions regarding x-rays, the results from this study suggested that it was obvious that x-ray examination and x-rays in particular are not well understood by patients. There is thus a need for information and enlightenment if patients are to refrain from demanding x-ray examination for every health problem.

5.2.3.5 Lack of effective communication between patients and health care workers

The discussion in subsection 5.2.2 is also relevant to this section because results of this study must give rise to concern related to health information dissemination (Chesson et al.2002:480). The fact that 60.5% of the study participants indicated that they obtained

information about x-rays from health care workers and that 83.6% said they would trust health care workers as a source of proper information about x-rays need to be considered

in the wider context of health communication between health care providers and patients.

Health care providers were better placed to provide factual information about x-rays. The study showed that the majority of the respondents (83.6%) trusted health care workers as a source of factual information about x-rays. This is in line with Goske and Bula's (2007:903) argument that reliable and understandable health information is the responsibility of health care providers and the right of the patient.

The results of this study, however, revealed that health care workers were lax in their dissemination of information about x-rays. This was reflected in the respondents' comments which suggested that health care workers and in particular doctors did not even communicate the results of x-rays to their patients. Greater attention to health worker-patient communication might help health workers to build trust and respond sensibly to patient demand. Patients must feel free to ask about x-rays and get appropriate answers.

5.2.3.6 Lack of public health awareness

Evidence from literature indicates that diagnostic radiography, which also includes plain or conventional radiography, carries small but real risks (Lockwood et al. 2007:121) Data presented in this study suggested that respondents were not aware of the radiation risks associated with x-rays because 74.5% of the surveyed patients were not aware that x-rays carry a risk (subsection 4.5.4, question 13). These results support the findings of a research conducted in Turkey which showed that few patients knew that x-rays could be hazardous though they were aware that x-rays were used in mammography (Yùcel et al. 2005:37).

The results demonstrated the need for health education about x-rays in the study population. Since decision-making involves making a choice, which in many cases

involves trade off, patients should be well informed. Public health education can influence the general population and in particular patients not only to have a positive

attitude about medical x-rays but also to be aware of the risks. Some researchers suggest that making information available to patient about radiation risk may reduce unwarranted x-rays without specific clinical indication (Balagué & Cedraschi 2006:511).

It is only by making evidence-based information available to patients in an easy-to-understand form and also by ensuring that patients have adequate time to discuss benefits, costs and risks associated with x-rays that patient demand for x-ray will be done with truly informed consent (Picano 2004:851b). However, the challenge for hospital policy makers is how to establish an effective health education programme that will not scare patients but allow them to have access to beneficial x-ray examination without unnecessary overuse. This is further compounded by the fact that discussion of radiation risk is considered a complex topic (Goske and Bula 2009:902).

5.2.3.7 Barriers to x-ray services

Lyon and Reeves (2006:284) ague that the likelihood of patient demand, in this case for x-ray examination, is thought to depend on the balance between perceived benefits and barriers to preventative action. Moreover, HBM assumes that cost is one of the determinants of health-seeking behaviour. However, the results of this study contradict this assertion. What the study found was that there was no association between respondent's income and demand for x-ray examination. While this observation may differ from the results of other studies which found an association between socioeconomic factors and the use of x-ray (Semin et al. 2006:533), it however supports the findings of Wang's et al. (2008:387) which showed that the use of conventional x-ray and computerised tomography was not influenced by one's socioeconomic status.

The findings further suggest that the majority of the study participants did not have any particular reason that could hinder them from demanding an x-ray examination. For instance a bigger proportion (65.5%) of the study sample indicated that they would still be x-rayed even if they were asked to pay extra. This was despite the fact that more than

half of respondents were unemployed. The case might be that the participants did not have an idea whatsoever as to what the cost of x-ray examination could be. The results

further showed that 50.9% of the respondents would be willing to be x-rayed even if they knew x-ray carried a health risk.

5.3 LIMITATIONS

This study had several limitations that should be taken into account when interpreting the results. First, it might be important to note that this study was contextual, as the research was conducted in a single KZN rural hospital. Therefore, the results cannot be generalised to other South Africa rural hospitals due to the complexity of human behaviour and its social intricacies, factors that could influence patient demand for x-ray examination in one locality may not have the same effects in another. Therefore, it must be noted that factors that influence patient demand for x-ray examination at this rural KZN hospital may vary substantially from one population group to another depending on cultural, socioeconomic and social pattern.

A cconvenience sampling was used in the selection of respondents and as this method does not allow for a representative sample to be selected, the difference between the sample and the study population was not ascertained.

There may be a questionnaire problem that may need adjustments if it is adapted for similar studies in future because there were some conflicts in the way respondents viewed the importance of x-ray examination.

Of the 110 respondents, 41.8% indicated that they had a problem with a doctor who did not request an x-ray examination. On the other hand 54.5% believed that a doctor could not treat properly without an x-ray examination. This may be questionnaire problem that may need adjustments if it is adapted for similar studies in future.

5.4 RECOMMENDATIONS

Despite the limitations of this study, it is an important research that may be used as a point of departure for other studies. In light of the above and in the setting of limited valuable health care resources and budgetary constraints, results from this study may help in understanding factors influencing patient demand for medical x-rays. These results can help to formulate a plausible strategy for the reduction of unwarranted x-ray examinations resulting in the reduction of unnecessary radiation exposure to the patients. Based on these findings, strategies aimed at reducing unwarranted demand for x-ray examination by patients can be developed and implemented without having negative effect on patient satisfaction and clinical management.

A questionnaire was developed for this study. This questionnaire maybe used in other studies after making necessary changes in line with the context.

Below are the recommendations some of which have been adapted from a study done by Espeland et al. (2001:1361): Health education or communication is an element of each of the following recommendation.

5.4.1 Health care providers and information dissemination

Some researchers suggest that giving patients effective explanations about, for instance, the inability of x-rays to screen for pain and the risk associated with radiation, may be a key factor in reducing unwarranted demand (Little et al. 1998:265). This, however, must be done in a manner that is not alarming. The following recommendations are made in this regard:

- Health care providers and in particular doctors should discuss issues of importance with their patients during clinical encounters; in this case x-ray examination.
- Doctors and other health care providers should negotiate with patients with the aim of influencing their expectations of x-rays.

- Health care providers (doctors, physiotherapists, and nurses) should avoid giving

conflicting information and advice on x-rays by cooperating and liaising with other providers especially radiographers and radiologists (where available). The latter may initiate discussions in this regard.

5.4.2 Importance and capabilities of x-rays

Other than the traditional medical ethics of respect for patient autonomy, Rogers (2002:140) argues that preventing harm and acting for the good of the patient are equally significant ethical obligations. Thus health care providers should assume responsibilities of patient education on the benefits, cost and effects of medical x-rays as recommended below:

- Health care providers and especially doctors should be able to explain effectively to the patient that clinical history and assessment are usually enough to enable the provider to provide proper treatment.
- Patients should be told that other than being associated with radiation risk, x-rays have limited diagnostic capabilities and that there are other modalities that can be used for the same purpose with better results and fewer or no radiation risks involved, for example sputum tests for TB or sonar (where available).
- New evidence on the complexity and uncertainty of risks and benefits associated with x-rays as it emerges should be made available.

5.4.3 Public health education

The strategy of informed choice, according to Goske and Bulas (2009:902), promotes the use of aids. Moreover, in most western countries patients are required to seek out information and consider treatment options (Haldeman 2001:308). Increased awareness among the patients and the community in general will help reduce the number of unwarranted x-ray testing and thereby significantly reduce the biological burden on current and future generations. It is against this background that Haldeman (2001:308)

argues that patients should be given access to information if they are to consider options.

Therefore, this requires that patients be given access to the available radiological modalities by health providers. Recommendations in this regard are as follows:

- Standardised pamphlets/flyers about x-rays taking into account the language, educational level and culture of the target population should be produced.
- The hospital, in conjunction with radiographers, should develop awareness campaigns which may include activities aimed at sensitising health care workers, patients and the general public about pros and cons of x-ray services.
- An effective and persuasive public health campaign that must attempt to influence patients' cognitive factors such as perception, attitude and belief should be designed. This, however, must be supported by an effective and sustainable point of care guidance. This means that doctors and nurses and other health care worker who refer patients must be equipped with knowledge about x-rays to enable them articulate well with the patients.
- Mass media communications to disseminate information about x-rays should be used.

5.4.4 Recommendations for further research

- This study could be replicated at other KZN and South African rural hospitals in order to establish the validity of the findings of this study.
- This study could be extended by including more KZN rural hospitals in one large study.
- An educational campaign could be conducted and the study repeated.
- A study could be conducted to determine the knowledge of x-rays by other health care professions that frequently come in contact with patients.
- Other studies on factors influencing the use of x-rays from the doctors' perspective may be needed to confirm, complement or challenge the findings of this study.

- A study could be done to compare patients seeking health care services in urban with those in rural areas with particular attention to x-ray.

It is important, however, to emphasise that the likely success of these recommendations depends on a multifaceted and coordinated approach involving all stakeholders.

5.5 REFLECTIONS ON THE STUDY

This research may somehow provide a better understanding of how patients try to arrive at acceptable decisions in the face of conflicting pressures and uncertainty. It shows that decisions about radiological tests not only are a result of patients' considerations but also take place in a wider cultural, social and societal context.

The study brought the researcher in contact with a number of patients with varying interests in x-ray. It is worth noting that they were patients who demonstrated real interest and keen participation despite the technical nature of the subject. This caused the researcher to reconsider the common argument that is always put forward in radiography meetings that dissemination of radiographic information to the patient is almost impossible because of its technical nature

5.6 CONCLUSION

This study points out several factors some of which differ from those cited in other studies to be precursors of unwarranted demand for x-ray examinations by patients.

It follows from the above results that a deeper understanding that might be gained through further studies is needed to formulate a clear picture of the dimensions that a problem of demand for x-ray examination is having on both patients and health care resources. A question that arises at the completion of this study is do patients seeking x-ray services at this KZN rural hospital differ significantly from other patients with regard to factors influencing demand for x-ray examination. Therefore, further studies

are needed to establish the validity of this study's findings and especially there generalisibility.

Until then the problem may remain elusive and strategies to reduce patient's demand for unwarranted x-ray examination in rural KZN may continue to remain out of reach.

> *"By exploring how the lens of radiology has changed our medical vision, we can better understand what radiologic imaging reveals and avoid the mischief that might result from failing to recognize the blind spots of this technology."*
>
> *Gunderman Richard B. 2005*

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ADDENDUM A

KwaMagwaza Hospital
X-Ray Department
P/B X808
Melmoth 3835
22nd March 2010

Dear Respondent

I'm a radiographer pursuing a degree in public health at the University of South Africa.

I'm inviting you to participate in a study: ***Factors influencing Patients' demand for x-ray examination***. The study is supervised by Prof. Annali Botha from UNISA (012 429 8814). Along with this letter is a questionnaire containing multiple choice questions. I'm requesting you to answer the questions. It should take you not more than ***25 minutes*** to complete the questionnaire. Your completed questionnaire can be returned to either the person who issued it to you or drop it in the box provided for this purpose in the x-ray department.

Participation in this study is voluntary. You are under no obligation to take part if you don't want to. Your refusal to participate will not have any influence on your medical care. Please be assured that all the information you provide will be kept confidential. In this regard, you do not need to sign anything. However, your completion and return of the questionnaire, thereof, will be deemed as consent.

If you have any questions or concerns about completing the questionnaire or about being in this study, please do not hesitate to contact Mr. Zulu Themba (Research assistants) or Mr. Bernard. Mung'omba (Principal Researcher) at the x-ray department.

Thank you for your participation in the study

B. MUNG'OMBA

ADDENDUM B **1**

INTERVIEW SCHEDULE

QUESTIONNAIRE

Section 1: Respondents' Demographic Characteristics

Inpatient ☐ Outpatient ☐

1. Please indicate your gender by ticking in the appropriate box

Male ☐

Female ☐

2. How old are you?.....

3. Please indicate your level of education by ticking in the appropriate box

No formal education	Grade 1- 4	Grade 5 - 7	Grade 8 -12	Apprentice/ In-service	University/ College

4. What is the source of your income?

Employed ☐ Unemployed ☐

Self Employed ☐ Receiver of grants/Pensioned ☐

Others ☐

Please explain

……...

……
…

5. Please indicate in the box what closely relate to your reason of coming to the hospital.

Illness ☐ Pre-employment medical check-up ☐

Injury ☐ Other ☐ Please explain……

……

……

6. Did you ever had an x-ray examination before?

Yes ☐

No ☐

Section 2: Knowledge about x-rays and other aspects:

Questions 7, 8, 10-13 are about what know about x-rays. Remember whatever information you give is strictly confidential.

7. Have you ever heard about x-rays before?

Yes ☐

No ☐

If your answer is yes – go to question 8
If your answer is no – go to question 9

8. From whom did you get information about x-rays? (Tick more than one if applicable)

Family member ☐ Health care provider ☐

Friend ☐ Media (health education) ☐

Other ☐ Please explain…….

…….
……

9. Please explain your understanding of what an x-ray is.

……..
……
……
……

10. Can X-rays alone prevent diseases?

Yes ☐

No ☐

I don't know ☐

11. Can X-rays alone prevent injuries?

Yes ☐

No ☐

I don't know ☐

12. Can X-rays be used to show all the diseases?

Yes ☐

No ☐

I don't know ☐

13. Do X-rays pose any associated health risk?

Yes ☐

No ☐

I don't know ☐

14. What information do you think health workers/doctors get from an x-ray examination?

……..
……
……

15. Which source would you trust to give you proper information about x-rays? (Tick more than one box if applicable)

Family member ☐ Friend ☐

Health care provider ☐ TV/Radio/newspaper (Media) ☐

Other ☐ Please explain……

16. Should the doctor/nurse briefly tell you about x-rays before sending you for x-ray examination?

Yes ☐

No ☐

17. Do you a have problem with a doctor who sends a patient to collect medicine without having an x-ray done?

Yes ☐

No ☐

18. Are the results from x-ray examination more reliable than the doctor's clinical assessment without x-ray examination?

Yes ☐

No ☐

I don't know ☐

19. Does X-ray examination have the ability to reveal all illnesses/pain?

Yes ☐

No ☐

I don't know ☐

20. Can the X-ray show TB better than having sputum tested in the laboratory?

Yes ☐

No ☐

I don't know ☐

21. Can an x-ray help to reduce pain?

Yes ☐

No ☐

I don't know ☐

22. Should all who are involved in an accident be sent for an x-ray regardless of their condition?

Yes ☐

No ☐

I don't know ☐

23. If your child comes home with a swollen elbow, will you consult a traditional healer first?

Yes ☐

No ☐

24. If your child comes home with a swollen elbow will take him/her to the hospital for an x-ray?

Yes ☐

No ☐

25. Can a traditional healer reveal a bone fracture that cannot be detected by an X-Ray?

Yes ☐

No ☐

I don't know ☐

26. Must all patients who are coughing ask for an x-ray?

Yes ☐

No ☐

I don't know ☐

27. Can a doctor treat a patient properly without an x-ray?

Yes ☐

No ☐

I don't know ☐

28. Will you still be wiling to x-rayed if you were informed that undergoing x-ray examination will be painful in your case?

Yes ☐

No ☐

29. Is taking x-ray expensive?

Yes ☐

No ☐

I don't know ☐

30. Will adequate information about x-rays affect your decision on whether to make use of it?

Yes ☐

No ☐

I don't know ☐

31. If x-ray services are more accessible, I will make use of it.

Yes ☐

No ☐

I don't know ☐

32. Will you still be willing to be x-rayed, even if you should know that there is a health risk associated x-rays?

Yes ☐

No ☐

I don't know ☐

33. Will you still be x-rayed if you were required to pay extra for x-rays?

Yes ☐

No ☐

34. What would you like to know about x-rays?

……
……
……
……