ASSESSMENT OF IMPACTS OF ROBOETHICS IN THE KENYAN HEALTHCARE SYSTEM CASE OF NAIROBI HOSPITAL

CALEB SIMIYU WAMALWA

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A RESEARCH PROJECT SUBMITTED TO THE SCHOOL OF COMPUTING AND INFORMATICS IN THE PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE IN GRETSA UNIVERSITY

DECEMBER 2024

Declaration

I declare that this is my original work and I have done it to the best of my knowledge. It has not been submitted to any other institution of higher education for the award of degree anywhere.

The sources that I have used have been acknowledged by references.

Signature: _____ Date: 11/12/2024

Caleb Simiyu Wamalwa

ICT-G-4-1454-21

Signature: _____ Date: 11/12/2024

Sharon Mose

School of Computing and Informatics

Gretsa University

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Abbreviations and Acronyms

AI: Artificial Intelligence
RoboEthics: Robotic Ethics

Operational Definitions of Terms

Ethics
Robots
Roboethics
Accountability
Legal Frameworks and Policies

Abstract

Ethics is a system of moral principles that include ideas about right and wrong, and how people should (or should not) behave in a general and specific case. Also, we can define ethics as the branch of knowledge that deals with moral principles. This leads us to ask ourselves what are robotic ethics commonly referred as roboethics? According to Wikipedia, roboethics refer to specifically to the ethics of human behavior towards robots, as robots become increasingly advanced.AI has made a significant impact on various industries and sector including medical and health care system.AI applications through robotics has literally changed the medical field such as biological extensive data analysis, speeding up processes, new drug discovery,laboratory diagnosis statement, precision medicine etc. The problem at hand is that health professionals and patients are not aware of roboethics. Even if there are some who know they are not fully aware of its impact in the healthcare system. There has been high existence of roboethics and not all healthcare professions are aware of them and also not all implement them in their daily work. The research will be done to view the impacts and assess them closely when robotic ethics and standards are implemented in their work of profession. This research will be done under a deductive approach. Method used to collect data was by use of questionnaires. Method used in sampling procedure will be probability sampling under random sampling. My target population was 100 members. The formula used to calculate sample size was : n = N 1+$N(e)$^2 . My sample size was 80 members.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Research Study

Research was based to check on how roboethics in the health care system has been gauging the grounded where with good policies it can be said that the robots are used sufficiently in the health care system. Since robot devices has been used from; processing and analysis of medical data, predictive preventive personalized participative medicine, telemedicine and virtual consultations, drug synthesis, operation robotics and AI, assistance to handicapped and elderly persons, robot companions and to rehabilitation and augmentation in health care system there has been impacts of either underutilization or not adhering to robotic ethics.
This study aimed to cover the impacts of roboethics in the Kenyan healthcare system. Roboethics is one of the ethics to be used in the artificial intelligence under robotics. Most of health professionals working at places such as theater, surgery rooms, and other places where there is the use of robotics devices or AI tool don't know and release the impacts of roboethics. Since, most of them have only be taught about medicine and few computer ethics. This research covered a broad area in the field of robotics since it has already been implemented and it's continued to be used in the health care system for better treatment.

1.2 Statement of the study

Roboethics have become the major issue in today healthcare system as doctors and nurses have been assuming the way things are handled with robots around them. This has been caused by lack of awareness of roboethics and lack of its transparency among the healthcare profession since they are only taught on medical ethics. Awareness should be made to all health care profession about the impacts of these ethics.

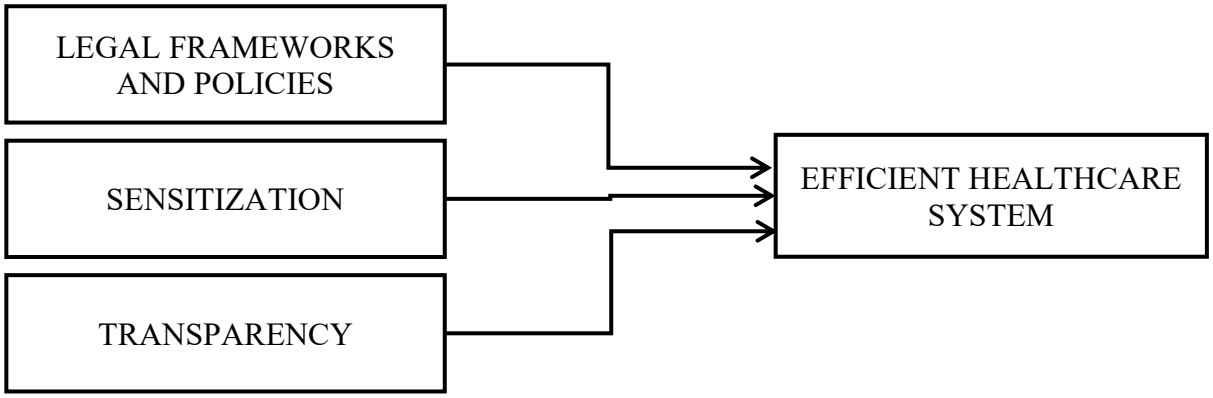
1.3 Purpose of the study

The purpose of the study aimed to establish the impacts of roboethics in the healthcare system in Kenya. Also, by checking few of variables such as legal frameworks and policies, sensitization and transparency. By confirming to this study it was established that roboethics has a significant impact to providing efficient healthcare system in Kenya.

1.4 Conceptual Framework

INDEPENDENT VARIABLES	DEPENDENT VARIABLE
1. Legal frameworks and policies	Efficient robotic healthcare system
2. Sensitization	
3. Transparency	

Figure 1 Conceptual Framework



1.5 Research questions

1. Have been legal frameworks and policies in existence used to formulate roboethics in the health care system?
2. How is the rate of sensitization on robotic ethics affect the health care system in Kenya?
3. How does transparency in robotic ethics affect the health care system?

1.6 Objectives

1.6.1 General Objectives

a) To assess the impact of roboethics in the health care system in Kenya

1.6.2 Specific Objectives

a) Evaluate the impact of legal frameworks and in the implementation of roboethics the health care system.
b) To assess the effect of sensitization in the implementation of roboethics.
c) To determine how transparency affect the implementation of roboethics in the health care systems.

1.7 Hypothesis

H1 Legal frameworks and policies that have been in place have not affected the health care system.

H2 By sensitization of roboethics on healthcare system health professionals are not aware.
H3 Transparency on application of roboethics on healthcare robot devices has a constant impact.

1.8 Significance of the study

Hospitals being the main and central place where most robotics used in the healthcare system are being implemented, this study has proved that roboethics plays a major role in the health sector in Kenya. If roboethics accepted implemented in our healthcare system there will have made a significant move in promoting universal healthcare in Kenya. Abiding by earlier and also coming up with legal frameworks and policies in the robotic field, it will aid in impacting how users will abide with the rules and regulations.
Through proper sensitization among patients, doctors, nurses and other medical staff, they will practice and implement roboethics in the healthcare system. By disclosing the principles and values from roboethics there will be transparency among medical staff and patients in the use of robotic devices.

1.9 Scope of the study

This study was done within Nairobi Hospital and mainly it was done by descriptive type of a research. The knowledge depth of this research was a bit shallow since I was assessing if roboethics have an impact in the healthcare system. Most respondents were from the field of medicine; doctors, nurses and few patients where some technological devices were used on their treatment processes.

1.10 Limitation of the study

During the study research faced some unavoidable challenge which included:
Limited responses by the respondents. Some of the data were collected due respondents unwillingness to answer especially when the respondent opted to interview instead of questionnaires. Limited time as most respondents were staff workers and doctors and they spend most of their in their jobs hence they spent less time in responding to questions.
High cost as for a better demonstration on how the roboethics works most of robotics devices has to be used and implemented. This will required a bit of cost since the professionals handling the devices demands a bit token to showcase their ethics and the knowledge they had in AI field.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews the previous studies carried out on robotic ethics commonly known as roboethics in the AI field. The entrance of robotic devices in the application of healthcare is already a fact. It has contributed both to progressive therapeutic care and expanding quality of restores benefit also evacuating and compensating harmed organs and human capacities. However, as technology entered into the health care settings, concerns about openness, statutory frameworks, and policies have been neglected. This study of the research was based on legal frameworks and policies, sensitization and transparency as independent factors as we examine complex effects of roboethics in the health care system. This literature review seeked to outline a thorough knowledge of how these factors interact and affect the ethical environment of healthcare robotics by previous research and scholarship.

2.2 Concepts of roboethics in AI

2.2.1 Roboethics Definition

Derived from two different words ‘robotics’ and ‘ethics’ forming the word “Roboethics”. According to Nikoleta Levint (2017) defines ethics as a set of moral perceptions that dominate a society. The term “roboethics” refers to the norms, ethical principles and guidelines that govern design, making of robots and execution of robots and artificial intelligence systems in different environment including healthcare. Getting to understand the background concepts of roboethics creates a good avenue foreseeing its impact on the healthcare system.

2.2.2 Ethical Dilemmas in the healthcare robotics

Researchers have researched on these dilemmas and their implications over healthcare professionals and patients. They found out that ethical dilemmas include privacy of patients, autonomy and biasness in decision making.

2.3 Legal frameworks and policies

2.3.1 Existing legal frameworks

Review on available legal frameworks and policies is done in this part within different regions and their effectiveness is checked concerning ethical concerns. There has been contrast in the application of already available policies in the field of health and in technological aspect.

2.3.2 Regulating frameworks and policies

From existing legal frameworks and policies, there has been inconsistencies and various gaps that made the health professions and workers not to exercise roboethics. We have to understand obstacles that healthcare has faced in attempting to regulate emerging technologies. Healthcare professionals and stakeholders are in a better position to close the gaps and accept the rules implemented by regulatory bodies.

2.4.3 Regulatory responses

Feedback from development regulatory body concerning guidance to creation of new laws and policies weighed down to check on their impacts in the healthcare system. How are professionals who break the ethics and cause a lot of harm handled? What about professionals who had a positive impact on the application of roboethics is rewarded by regulatory body. E (FoschVillaronga 2019)

2.5 Sensitization efforts

2.5.1 Professionals and public awareness

Healthcare professions and the public should be sensitized about the healthcare implications in regards with roboethics (Fosch-Villaronga, E. 2019). Not all robotic devices should be exposed to the public as this will be violating medicine ethics.

2.5.2 Ethical training for healthcare professionals

All healthcare professions should receive training and education in roboethics, along with additional strategies for improvement and continuation part. (Morone, G., Pirrera, A., Meli, P., & Giansanti, D. 2022) There has been a need to sensitize healthcare professions to the need to know how both technology, laws and ethics work in conjunction in the healthcare.

2.6 Transparency in roboethics

2.6.1 Transparency

Transparency has recently become a topic of interest in the use of robotics in the health care system. Research into making roboethics is still young. Very few researchers focus on the transparency in roboethics when building robotic devices to aid in the health care system. Transparency in healthcare robotics plays an important role in fostering ethics in healthcare system (Bilal, A. 2022).

2.6.2 Lack of Transparency

From studies conducted, shows that some of healthcare practionners lacks transparency in robots resulting to lack of accountability and unwanted consequences. Assessing the impacts of roboethics practices in the healthcare system guides us to knowing how and to which extent of effect it leads to fostering healthcare sector.

2.6.3 Transparency Solutions

Through various research and technologies several solutions have been proposed such as through auditing by expertise, explainable artificial intelligence and exposed decision-making concerning accountability and reliability. Also, developers should learn to design transparent systems able to build confident relationship between the human participants and the robot. Selecting the best suit on effectiveness of these solution is a better way of curbing ethical challenges.

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction

This chapter will determine the methods of research that I will use to achieve set objectives of the study. Through appropriate research methods I will look at the methods of data collection, sampling techniques and also techniques of data analysis.

3.1 Research Design

According to Creswell (2009), research design refers to the plan and procedures that cover the entire decisions from high level assumptions to the methods used for gathering and analyzing data. The main purpose of this research will enable us to understand the impacts of roboethics in the healthcare system in Nairobi Hospital in Kenya. In this research, I will be using quantitative type of research since it gives the general impacts of roboethics in the application in the healthcare system. In this research deductive approach method will be used in which every respondent is willing to cooperate and capable of giving us accurate and complete information efficiently. With deductive approach I will be able to know and understand the impacts that have been there by applying and not applying roboethics in the Kenyan healthcare system.

3.2 Study Area

Study area is a specific location where the actual research is going to take place. This research will be conducted within Nairobi Hospital, Kenya.

3.3 Target Population

The target population covers all individuals or things where data is obtained and conclusion made from it. The target population in among hospital was 500 the medical professionals such as doctors and nurses from various places within the health facility.

3.4 Sampling Techniques

This is the criterion of selecting individual members to make inferences from them and estimate the characteristics of the whole population. Non-probability method suits the research since a researcher is not interested in selecting a sample that is representative of the population and mostly used in qualitative studies because the focus is on in-depth information and not making inferences or generalizations. The methods of non-probability are cluster sampling and systematic random sampling.
Since this research focuses on the impacts of robotics ethics in the healthcare system in Kenya and the targeted staff members ought to be knowledgeable in the field hence cluster sampling needs to be applied. Targeted members have the required information with respect with their objectives of the study.

3.5 Sample Size

This study targeted 500 participants that have knowledge and experience of roboethics in Nairobi Hospital since a small sample is required.
The formula used was provided by Yamane (1967:886) which provide a simplified formula to calculate sample sizes:

$n = N/(1+N(e)^2)$

Where by:
n = Required sample size
N = population size (population size)
Z = Confidence level (1.96 for a 95% confidence level)
P = Estimated proportion (0.5)
E = margin of error (0.05)
$n = (100)/(1+100(0.05)_2)$
n = 80
So, the required sample size is 100 to achieve a 95% confidence level with a 5% marginal error. Working out the formula the sample size will produce a sample of 80 individuals.

3.6 Measurement of Variables

Table 1. Measurement of variables

Variable	Measures/Indicators	Measurement Scale
Transparency	Roboethics in place	Nominal Scale
Legal Framworks and Policies	Rules and Policies already in existence	Nominal Scale
Sensitization	How many were aware	Nominal scale
Efficient Healthcare system	Roboethics in place	Nominal scale

3.7 Research Instruments

The favorable instrument used in a questionnaire as the main research instrument Nairobi Hospital. The questionnaires were closed ended questions for the targeted members in healthcare system.

3.8 Validity of Measurements

Validity refers to how well the measurement yield accurate results. According to Bryman (2012) validity refers to the issue of whether an indicator that is developed to measure a concept really gauges that concept. Nairobi Hospital and their inner daily operations are key concern with this study with operations related to technology especially AI.

3.9 Reliability of Measurements

When the same results are obtained consistently by using the previous methods without any change, the measurement is termed as reliable. Both closed and opened ended questionnaires are the best techniques to obtain data.

3.10 Data Collection Techniques

The primary technique to be employed in the collection of data is questionnaire which constitute of both open-ended and closed-ended in relation to robotic ethics in Nairobi hospital. This method of data collection is more preferred since medical staff are literate who can read and write.

3.11 Data Analysis

Since we are looking for the answers to how and when questions, qualitative analysis is suitable to analyze data obtained. The data can as well be represented using graphs and tables.

3.12 Logistical and Ethical Considerations

Healthy environment is one of the most sensitive sectors should be given the highest priority. According to (2009) research ethics refers to norms and standards of behavior that guide moral choice about our behavior. This is the rights that govern the collection of data from the field. According to (Moses) ethical approval preserves the rights and integrity of the human respondents involved in the research study. A mutual agreement should exist for smooth collection of data.

CHAPTER FOUR: FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents data analysis and interpretation. The main objective of this study was to assess the impacts of roboethics and various ways to incorporate roboethics in the Kenyan healthcare system. The population of the study consisted of doctors, nurses and some patients. Roboethics has been a major concern since only few medical practitioners are aware of them. They were only informed and taught about medical and work ethics.

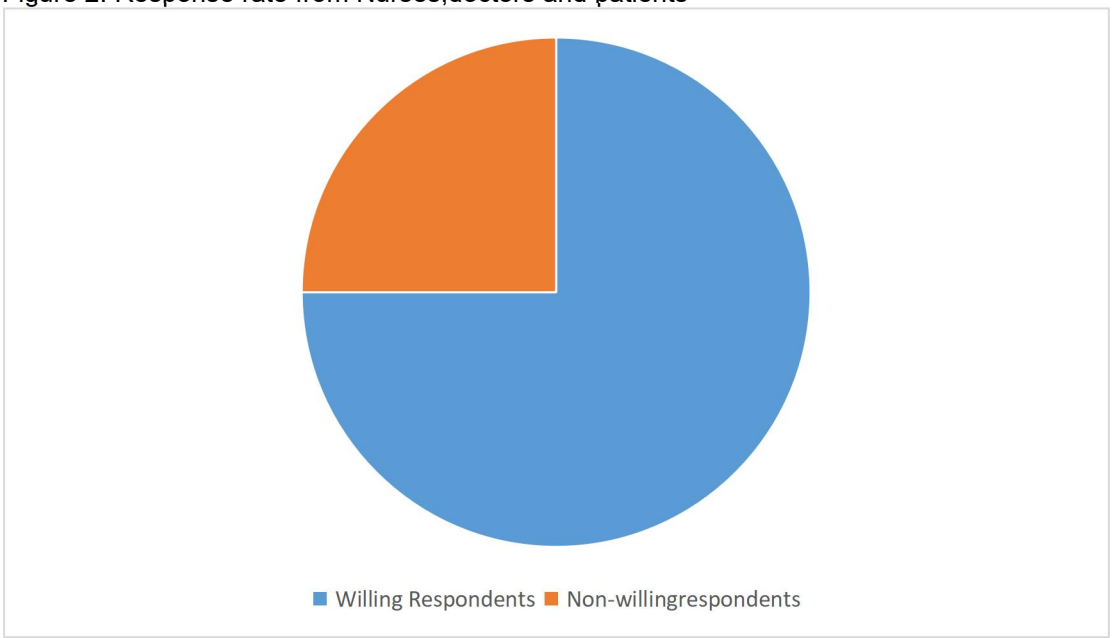
4.2 Response rate

The research targeted 500 medical staff and patients . The targeted respondents were doctors, nurses and patients responsible for delivering efficient healthcare system in Nairobi Hospital. The responses indicate the impacts felt in the adoption of roboethics in the healthcare system in Kenya. By help of various responses I was able to identify various impacts of roboethics in Nairobi Hospital that are relevant to the adoption of roboethics in other hospitals within Kenya for efficient healthcare delivery.

Table 2. Response rate from questionnares

Group	Sample	Respondent	Percentage(%)
Doctors	14	11	75
Nurses	42	31	
Patients	24	18	

Figure 2. Response rate from Nurses,doctors and patients



4.3 Demographic Information

4.3.1 Age of Respondent

Table 3. Age of Respondents

Age	Frequency	Percent %	Cumulative Percent
Under 18	0	0	0
18 - 24	5	8.33%	8.33%
24 - 34	8	13.33%	21.66%
35 - 44	13	21.68%	43.34%
45 - 54	12	20%	63.34%
55 - 64	14	23.33%	86.67%
65 and above	8	13.33%	100%

From the questionnaires filled most of the respondents were of age bracket 55 – 65 years. It was this way because at the hospital most employees were employed based on the experience and working history. Most of respondents were from 25 years and above whereas I received less response from members who were below 25 years.

4.3.2 Level of Education

Table 4. Level Of Education

Level of Education	Frequency	Percent	Valid Percent	Cumulative Percent
Diploma	27	33.75%	33.75%	33.75
Degree	16	20%	20%	53.75
Masters	5	6.25%	6.25%	60
Others	12	15%	15%	75
Total	**60**	**75%**	**75%**	

As any other professions, members must at least be knowledgeable about some certain fields. From the research conducted I concluded that most respondents have attained a diploma certificate from Kenya Medical Training College. Followed by doctors who have attained a degree in the field of medicine from various university locally and abroad.

4.3.3 Gender

Table 5. Gender

Gender	Frequency	Percentage
Male	27	33.75
Female	33	41.25
Total	60	75%

Female respondents were easily approachable than men. The additional factor was that most nurses were female and fewer were men. Male doctors were had to find but responded well to questionnaires, since they were committed to providing a better service to others.

4.3.4 Period of Working

Table 6. Period of working

	Frequency	Percent	Valid Percent	Cumulative Percent
Below one year	2	2.5%	2.5%	2.5%
1 - 10 years	11	13.75%	13.75%	16.25%
11 - 20 years	18	22.5%	22.5%	38.25%
21 - 30 years	13	16.25%	16.25%	55%
31 - 40 years	8	10%	10%	65%
41 - 50 years	3	3.75%	3.75%	68.75%
51 years and above	4	6.25%	6.25%	75%
Total	**60**	**75%**	**75%**	

4.4 Legal Frameworks and Policies

The feedback on the legal frameworks and policies as one of the dependent variable had over 22% of the respondent who agreed that it had an impact as far as efficient healthcare system is concerned, that is 18.34% Strongly agreed and 14.17% agreed. However more than 44% disagreed on the issue of legal framework and policies as it had an effect on healthcare system, where 22.92% disagreed and 20.83 strongly disagreed. Finally, 23.75% of the respondents had neutral as their choice.

Respondents were not aware if there were variations in legal frameworks and policies as there was even distribution of answers.

Most members agreed that there were gaps and inconsistencies within existing legal frameworks since 20 respondents strongly agreed and even mentioned already existing gaps.

On the question whether legal frameworks and policies affected the decision-making process, most respondents were not aware if it affected followed by a smaller percentage where they disagreed and strongly disagreed that legal frameworks and policies affected decision-making process.

Few respondents agreed that healthcare professionals perceived frameworks as effective and adequate. Most respondents disagreed that healthcare professions did not perceive that legal frameworks and policies weren't effective and adequate.

Table 7. Collected reponse of Legal Frameworks and Policies from questionnairs

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
Variations in Legal frameworks and policies influence ethical considerations in use of robotics	12	10	15	13	10	60

There are gaps and inconsistences within the existing legal frameworks and policies	20	8	10	10	12	60
Legal frameworks and policies impact the decision-making processes	8	9	18	15	10	60
Healthcare professionals perceive current legal frameworks and policies as effective and adequate	4	7	14	17	18	60
Total	**18.33%**	**14.17%**	**23.75%**	**22.92%**	**20.83%**	**100%**

4.5 Sensitization

On the issue of sensitization to healthcare system respondents were also to base their choices on agreeing, disagreeing and neutral. Most of respondents agreed that sensitization have an effect on healthcare system with 27.92% strongly agreeing and 22.9% agreeing. Respondents who disagreed were 30% where 16.25 %disagreed and 13.75% disagreed. Only 19.17% of respondents were neutrals.

Respondents who answered questionnaires were somehow aware that some stakeholders were fully committed to influence sensitization programs in the healthcare. Whereas other respondents disagreed and others were neutral on their response.

Most respondents were fully in agreement that there were a lot of facilitators and few barriers towards effective sensitization in the healthcare about roboethics. Only a few disagreed on the existence of barriers and facilitators towards effective sensitization. Other members were not able to discern whether to agree or disagree.

Table 8. Collected responses on sensitization on data collected

	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Total**
Stakeholders influence success of sensitization programs	18	13	11	10	8	60
There are barriers and facilitators to effective sensitization	22	18	10	6	4	60
There is effectiveness in sensitization initiatives	7	9	12	15	17	60
Government led campaigns impact sensitization process	20	15	13	8	4	60
Total	**27.92%**	**22.91%**	**19.17%**	**16.25%**	**13.75%**	**100%**

4.6 Transparency

Finally on the case of transparency, respondents agreed that it had a huge impact of roboethics in the healthcare system. The response was as follows 33.75% strongly agree, 24.34% agree, 18.33%neutral, 12.08% disagree and 7.5% strongly disagree.
Most of the respondents agreed that there has been a lot transparency recently in decision making since there is adoption of robotic technology and they fully aware what was happening on the ground and each decision involved. Only a few numbers of respondents disagreed in transparency in decision making and still insisted that this had a negative impact in the healthcare system.
Through the responses received stakeholders were seen on the forefront to influence integration of roboethics in the healthcare. They were heard openly making remarks about roboethics and its impacts on the healthcare. From response received they were stakeholders were open and transparent about roboethics.
From the responses received the level of transparency influence the efficiency of healthcare services and most members agreed on that. Some members could not comprehend whether to agree or disagree and the rest disagreed.
Most respondents agreed in uniform that increased transparency in outcome assessment contributed to continuous improvement and sustainability in the healthcare. From respondents that agreed confirmed that they were able to see their weaknesses and be able to overcome them.
These remarks improve sustainability of healthcare system as more patients were attended to in a smaller fraction of time. Members who disagreed with increased transparency saw their profession invaded as the outcome of assessment was made public to other people.

Table 9. Collected responses from Transparency questionnaires on data collected

	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Total**
Transparency in decision-making affect the adoption of robotic technology	17	19	12	7	5	60
Perception of healthcare stakeholder influence integration of roboethics in the healthcare	21	16	9	8	6	60
Level of transparency influence the efficiency of healthcare services	24	17	11	5	3	60
Increased transparency in outcome assessment contribute to continuous improvement and sustainability of healthcare system	19	16	12	9	4	60
Total	**33.75%**	**28.34%**	**18.33%**	**12.08%**	**7.5%**	**100%**

4.7 Efficient healthcare system: Dependent variable

From the responses received I discovered that most members agreed that adherence to roboethics influence the efficiency of healthcare system. The response was as follows 20% strongly agreed, 26.25% agreed, 15% neither agreed or disagreed, 8.75% disagreed and 5% strongly disagreed.

Table 10. Data collected from questionnare on efficient healthcare system

	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Total**
Adherence to roboethics influence the efficiency of healthcare delivery process, such as diagnosis, treatment and patient management	16	21	12	7	4	60
Total	**20%**	**26.5%**	**15%**	**18.75%**	**5%**	**75%**

4.8 Regression Analysis

The coefficient of determination (R-squared) is a measure of how well the independent variables (predictors) explain the variance in the dependent variable (Efficient Healthcare System). R Squared is 0.950 indicating 95%of variance in the efficient Healthcare system. Adjusted R Square of 0.948 good to fit model data. Standard Error of the Estimate 0.273 indicates average magnitude of error predicting Efficient Healthcare System.

Table 11. Regression Analysis on Model Summary view

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.975[a]	.950	.948	.273

a. Predictors: (Constant), Transparency, Legal frameworks and policies, Sensitization

b. Dependent Variable: Efficient Healthcare System

The ANOVA table presented indicates a significant overall model fit, as evidenced by a high F value of 358.019 ($p < .001$). The regression model accounted for a substantial portion of the variance in the dependent variable, with an R-squared value of 0.952. The Anova model had a high regression significance of <0.001. This suggests that factors related to roboethics play crucial roles in determining the efficiency of the healthcare.

Table 12. Anova table on Regression Analysis

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	79.774	3	26.591	358.019	<.001[b]
	Residual	4.159	56	.074		
	Total	83.933	59			

a. Dependent Variable: Efficient Healthcare System

b. Predictors: (Constant), Transparency, Legal frameworks and policies, Sensitization

The coefficients table indicate that Transparency emerges as a significant predictor, indicated by its substantial unstandardized coefficient (B = 0.884, p < .001) and standardized coefficient (Beta = 0.916). This suggests that transparency in the implementation of AI technologies within healthcare has a considerable positive impact on the efficiency of the healthcare system.
Conversely, Legal frameworks and policies and Sensitization demonstrate non-significant associations with the efficiency of healthcare delivery, as indicated by their non-significant coefficients and p-values above the conventional threshold of 0.05.

Table 13. Coefficients table on Regression

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.108	.102		1.058	.294
	Legal frameworks and policies	.117	.148	.129	.790	.433
	Sensitization	-.061	.274	-.065	-.223	.824
	Transparency	.884	.179	.916	4.948	<.001

a. Dependent Variable: Efficient Healthcare System

4.9 Correlation Analysis

Spearman’s model of correlation within independent and dependent variables

4.9.1 Spearman’s correlation between efficient healthcare system and Legal Frameworks and Policies

The Spearman's rho correlation coefficient between legal frameworks and policies and an efficient healthcare system reveals a strong positive correlation of .950 (p < .001). This suggests a robust relationship, indicating that as legal frameworks and policies evolve or strengthen, the efficiency of the healthcare system tends to improve significantly.

The correlation between legal frameworks and policies and an efficient healthcare system is statistically significant at the 0.01 level (2-tailed), underscoring the reliability of the observed relationship. This implies that the correlation observed is highly unlikely to have occurred by random chance

Table 14. Spearman's correlation between Legal Frameworks and Policies with Efficient Healthcare System

Correlations

			Legal Frameworks and Policies	Efficient Healthcare System
Spearman's rho	Legal Frameworks and Policies	Correlation Coefficient	--	
		Sig. (2-tailed)	.	
		N	60	
	Efficient Healthcare System	Correlation Coefficient	.950**	--
		Sig. (2-tailed)	<.001	.
		N	60	60

**. Correlation is significant at the 0.01 level (2-tailed).

4.9.2 Spearman's correlation between Efficient Healthcare care system and sensitization as variables

There is a strong positive correlation where increased sensitization on roboethics tend to coincide with higher efficiency with the healthcare systems. The Spearman's rho correlation coefficient between sensitization on roboethics and an efficient healthcare system indicates a strong positive correlation of .949 ($p < .001$).

The correlation between sensitization on roboethics and an efficient healthcare system is statistically significant at the 0.01 level (2-tailed), highlighting the reliability of the observed relationship. This implies that the correlation observed is highly unlikely to have arisen by random chance.

Table 15. Spearman's Correlation between sensitization and efficient healthcare system

Correlations

			Sensitization	Efficient Healthcare System
Spearman's rho	Sensitization	Correlation Coefficient	--	
		Sig. (2-tailed)	.	
		N	60	
	Efficient Healthcare System	Correlation Coefficient	.949**	--
		Sig. (2-tailed)	<.001	.
		N	60	60

**. Correlation is significant at the 0.01 level (2-tailed).

4.9.3 Spearman's correlation between Transparency and efficient healthcare system

The Spearman's rho correlation coefficient between transparency and an efficient healthcare system indicates a strong positive correlation of .956 ($p < .001$). This suggests that as transparency in healthcare practices increases, the efficiency of the healthcare system also tends to increase significantly.
The correlation between transparency and an efficient healthcare system is statistically significant at the 0.01 level (2-tailed), emphasizing the robustness of the relationship observed in the data. This implies that the correlation observed is not due to random chance but reflects a genuine association between these variables

Table 16. Spearman's correlation between transparency and efficient healthcare system

Correlations

			Transparency	Efficient Healthcare System
Spearman's rho	Transparency	Correlation Coefficient	--	
		Sig. (2-tailed)	.	
		N	60	
	Efficient Healthcare System	Correlation Coefficient	.956**	--
		Sig. (2-tailed)	<.001	.
		N	60	60

**. Correlation is significant at the 0.01 level (2-tailed).

4.10 Hypothesis Testing

HO1: Legal frameworks and policies that have been in place have not affected the healthcare system. The findings suggest a substantial impact, highlighting the importance of legal and policy interventions in shaping the efficiency of healthcare delivery. But on the contrary, the strong positive correlation of 0.950 observed rejects the null hypothesis that legal frameworks and policies have had no effect on the healthcare system.
HO2: By sensitization of roboethics on healthcare system healthcare professionals are not aware. The strong positive correlation observed contradicts the null hypothesis that sensitization of roboethics does not impact healthcare professionals' awareness. Instead, the findings suggest that sensitization efforts significantly contribute to raising awareness among healthcare professionals regarding ethical considerations in the implementation of robotics technologies.
HO3: Transparency on application of roboethics on healthcare robotic devices has a constant impact. From the table above its significant that null hypothesis is rejected and the alternate hypothesis accepted. Since the P value from the table is less than 0.01. This implies that healthcare professional should accept transparency as it will positively efficient healthcare system.

CHAPTER FIVE: CONCLUSION AND RECCOMENDATIONS

5.1 Introduction

This chapter is simply discussion of the findings in chapter four and comparison of the findings to the literature view in chapter 2 recommendation, suggestion ad also improvement in case of future continuation of the research by me or any other person interested with this topic.

5.2 Summary

The main objective of this study was to assess the impact of roboethics in the healthcare system in Kenya. The study was to identify how roboethics impact the healthcare and its implementation in the system. The study employed a descriptive research design technique in gathering, analyzing, interpreting and presenting the information. The study was done in Nairobi Hospital where doctors, nurses and some few patients were involved as respondents. The target population was 80 but only 60 responses were received. Simple random sampling technique was used where each member was chosen by chance and had an equal chance of being included in the sample. Questionnaires were then considered most effective for data collection.

5.3 Conclusion

In our inquiry into the impacts of roboethics in the healthcare system, we rigorously evaluated legal frameworks and policies, sensitization, and transparency as independent variables, while evaluating their impact on healthcare delivery efficiency as the dependent variable. We discovered the critical interplay between these variables through extensive analysis and study,
revealing their enormous implications for the optimization of healthcare systems and patient outcomes. Our findings highlight the critical importance of strong regulatory frameworks, focused sensitization activities, and open communication in creating an ethical atmosphere conducive to the effective delivery of healthcare services. By explaining these processes, our study adds vital insights to the ongoing discourse surrounding the ethical integration of robotic technologies in healthcare, paving the road for informed decision-making and responsible innovation.

5.4 Recommendations

Based on assessment made on efficient healthcare system on a constant development, the healthcare system needs to adapt and implement various roboethics in the healthcare system.

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APPENDICES

6.1 Questionnaires

Part 1 General Information

1. Indicate your gender

Male [ ] Female [ ]

2. Fill your age bracket

Under 18 [ ] 18 -24 [ ] 25 – 34 [ ] 35 – 44 [ ] 45 – 54 [ ] 55 – 64 [ ] 65 and above [ ]

3. Current level of education

Diploma [ ] Degree [ ] Masters [ ] Others [ ]

4. Period of Working

Below 1 year [ ] 1 – 10 [ ] 11 – 20 [ ] 21 – 30 [ ] 31 – 40 [ ] 41 – 50 [ ] 51 and above [ ]

Part 2 Legal Frameworks and Policies

	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Total**
Variations in Legal frameworks and policies influence ethical considerations in use of robotics						
There are gaps and inconsistences within the existing legal frameworks and policies						
Legal frameworks and policies impact the decision-making processes						
Healthcare professionals perceive current legal frameworks and policies as effective and adequate						
Total						

Part 3 Sensitization

	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Total**
Stakeholders influence success of sensitization programs						
There are barriers and facilitators to effective sensitization						
There is effectiveness in sensitization initiatives						
Government led campaigns impact sensitization process						

Total						

Part 4 Transparency

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
Transparency in decision-making affect the adoption of robotic technology						
Perception of healthcare stakeholder influence integration of roboethics in the healthcare						
Level of transparency influence the efficiency of healthcare services						
Increased transparency in outcome assessment contribute to continuous improvement and sustainability of healthcare system						
Total						

Part 5 Efficient Healthcare system

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
Adherence to roboethics influence the efficiency of healthcare delivery process, such as diagnosis, treatment and patient management						
Total						

6.2 Work Plan

Month	September	October	November	December	January	February/ March
Chapter 1						
Chapter 2						
Chapter3						
Chapter4						
Chapter5						
Chapter6						