Summer Training

at

Healthark Insights

From 10th May 2021 to 10th July 2021

Summer Training Report

By

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MBA (Hospital and Health Management)

2020-2022

IIHMR UNIVERSITY

HEALTHARK

Date: 13th July, 2021

Whom So Ever It May Concern

This is to certify that **Ms. Avani Garde** worked with Healthark Insights Wellness Solutions LLP as an Intern Consultant from 10th May 2021 to 10th July 2021. During her internship, she conducted market assessment involving secondary research and basic excel modelling across Latin American, Russian and Saudi Arabian markets. She supported her seniors in preparing client deliverables in form of PowerPoint presentation and excel formats.

She has always shown responsible attitude towards the tasks assigned to her and completed them within time with utmost sincerity. She has been a good team player and was supportive to her other colleagues in the organization.

We wish her a bright future and success in her future endeavours.

Purav Gandhi

Sincerely,
Dr. Purav Gandhi
Founder & CEO
Healthark Insights

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Acknowledgements

This summer training with Healthark Insights was an incredible opportunity for learning and professional development. This two-month long internship with Healthark has given me the honor to work with industry experts, extremely talented and skilled professionals. I would like to take this opportunity to thank every person who has helped me during my endeavors in this organization and my university.

I owe my deepest gratitude and heartfelt thanks to **Dr. Purav Gandhi, Partner,** Healthark Insights, for offering me this golden opportunity to intern at his organization.

I express my special thanks to **Ms. Bansi Dave, Senior Consultant,** my industry mentor, who has been supportive, encouraging and motivating me throughout the internship. I sincerely thank her for all the guidance she has provided and for her time she had to spare from her busy schedule to guide and mentor me.

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I am extremely grateful to **Dr. Prahlad Rai Sodani, President,** IIHMR University, Jaipur for his gracious leadership and for granting me permission to undertake this internship.

Lastly, I am eternally thankful to my university mentor **Dr. Anoop Khanna, Professor,** IIHMR University, Jaipur, without his active support this project report could not have been completed. His ready assistance, keen interest, and valuable suggestions whenever I sought them provided me the knowledge and tools that I needed to successfully complete my project.

This Internship has been an important landmark and incredibly rewarding in terms of the insights I received, that I believe will aid me in my future ventures. It has been a great honour to be associated with a prestigious organization and the invaluable learnings will help me throughout my career.

Sincerely.

Avani Anand Garde

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List of Abbreviations

USA	United States of America
UK	United Kingdom
HIV	Human Immunodeficiency Virus
AIDS	Acquired Immunodeficiency Syndrome
PA	Per Annum
CAGR	Compound Annual Growth Rate
NCD	Non-Communicable Diseases
NGO	Non-Governmental Organization
FBO	Faith-Based Organizations
WHO	World Health Organization
GDP	Gross Domestic Product
IMR	Infant Mortality Rate
MMR	Maternal Mortality Rate
U5MR	Under-Five Mortality Rate
KSh	Kenya Shillings
MOH	Ministry of Health
KOL	Key Opinion Leaders
UNICEF	United Nations Children's Fund
KMPDB	Kenya Medical Practitioners & Dentists Board
NHIF	National Health Insurance Fund
OPP	Out of Pocket

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Part I: Observational Learnings

Organization Profile

Healthark Insights is a consulting firm which starts its journey in 2016, with an aim to resolve the most compound problems in healthcare & life sciences industry with the help of deep domain expertise, diverse skills and scientific rigor applied in the most appropriate manner. Since its establishment, Healthark Insights has finished 250 projects in countries throughout the world.

It was brough into being by a group of consultants from top strategy firms with a collective experience of 100+ years. Healthark has grown up into a team of specialists from various fields such as consulting, digital health, medicine, pharma, and medical devices, in addition to public health and management with a shared vision to tailor to the healthcare and life sciences industry.

Some of the services of the organization include strategy & research, digital health, forecasting & modelling, real world evidence, medical writing, business intelligence & reporting, claims analytics and KOL identification and mapping.

Strategy and Research

Strategy is the recipe by which the key marketing variables (positioning, pricing, product, promotion, advertising and distribution) are integrated and optimized. The development of an ideal strategy is an intricate undertaking and involves a great deal of research and analysis. Healthark offers complete assessments leveraging both primary and secondary research. Types of analysis performed include country/company profiling, market sizing, competitive intelligence, landscape assessments, and new product launch.

Modelling and Forecasting

Modelling and Forecasting is the method of putting together a prediction in Excel of how a company will do in the future. It includes pipeline forecasting, brand performance analysis, attribution models and customer journey and competitor analysis, epidemiology-based opportunity sizing, and benchmarking. Predictive modelling is the usage of artificial intelligence, probability and data mining to forecast or evaluation of more specific outcomes.

Clients

- Boehringer Ingelheim
- Eli Lilly & Company
- Deloitte
- Walmart
- IBM Watson
- Pfizer
- Abbott

Learnings

1. An online course was undertaken during the first week of the summer training internship to learn about the basics of MS Excel, introduction of data analytics, big data, types of analytics and different tools used for analytics. The course also included advanced excel functions like PowerPivot, statistical forecasting and creating interactive dashboards on Excel. Finally, visualization using PowerPoint, storyboarding, wireframing and effective presentation skills were also learnt. Key learnings from the course have been discussed in detail in the following section.

2. Basic Understanding the healthcare systems of different countries like United States of America (U.S.A), United Kingdom (U.K), Germany, Australia, India and Kenya.

3. Basic Understanding the insurance coverage, reimbursement scenario and the patient's journey in the healthcare system of different countries like USA, UK, Australia, Germany, India and Kenya.

4. Preparing market syndicated reports in therapeutic areas (cardiovascular, neurology, dermatology and infectious diseases), common diseases (diabetes, HIV/AIDS, sickle cell disease), oncology (breast cancer, cervical cancer, prostate cancer), rare diseases and healthcare services(dental, physiotherapy) for Kenya.

5. Comprehensive research on digital health market in Africa region and preparing a detailed presentation on PowerPoint highlighting the market drivers, restraints, market segmentation, competitive landscape, company profile, research & development initiatives, access and reimbursement scenario and future opportunities.

6. Extensive research on the pharmaceutical industry in Kenya and developing an elaborate presentation on the same. It included sections such as major pharmaceutical multinational companies manufacturing drugs, domestic players and segmentation of the market based on types of drugs, distribution channel, route of administration, future growth opportunities and market constraints.

7. Putting together a customer map of Geisinger Health System, an integrated healthcare provider in Pennsylvania, USA. It serves more than 3 million residents of Pennsylvania with its network of 12 hospitals and more than 100 health clinics in the region.

8. Case Study- U.S FDA accelerated approvals of oncology drugs

Online Course

1. **Name of the Course:** *Data Analysis and Presentation Skills: PwC Approach*
2. **Course Description:** It consists of five courses to help understand different data analysis techniques and tools, exploring excel as a tool to solve business problems, data visualization and interactive dashboarding and effective presentation using PowerPoint.
3. **Course Objective:** To learn about data analysis, data visualization and effective presentation skills.
4. **Course Contents:** Data-Driven Decision Making, Problem Solving with Excel, Data Visualization with Advanced Excel, and Effective Business Presentations with PowerPoint.
5. **Learning Methodology:** Whole course consists of video lectures, projects, cases, reading material and some data files for practice exercise, all of them have some weightage in learning the course.
6. **Key Learnings:** Different approaches to Data Analysis, introduction to Big Data, Data analytics languages, dashboarding and visualization in Excel.

Course 1: Data-Driven Decision Making

Data is a set of information, facts or other observations related to a specific question or a problem. Data can be categorized into two types- Structured or Unstructured data. Structured data can be defined as data that has high degree of organization while unstructured data is the data that is not organized in a defined manner and is text heavy.

Data Analytics is a science of examining raw data in order to draw conclusions that help organizations to make informed decisions. It helps an organization in identifying growth opportunities, driving innovations, operate more efficiently and manage risks.

Businesses solve complex problems in four phases viz Planning, Implementation, Measurement and Course Correction. Data Analytics can help solve questions in the planning and measurement phases.

Data Analytics Framework

There are four aspects to the data analytics framework. Outcomes, decisions and actions, insights, and discovery. During the discovery phase, a problem needs to be defined, or a hypothesis is developed, and data is collected and explored. During insights phase, data analysis is performed. In the actions phase, the insights are linked to actionable recommendations and an execution plan. Finally, the outcomes are reviewed that have transformed the business or a business unit.

Types of Analytics

The different types of analytics are as follows:

1. To understand the current state of affairs, Descriptive Analytics is used. It is used for answering “What happened” questions. It is useful understanding sales pattern, customer behaviour and past competitor actions.

2. Diagnostic Analytics is used for answering “Why did it happen” questions. It is required to get a deeper understand of the situation.
3. Predictive Analytics is forward looking analysis. “What would happen in future” questions are answered using predictive analytics.
4. Autonomous, also known as Adaptive Analytics offers answers to the question “How does the system adapt to changes?” Autonomous care driving is an example of adaptive analytics.

Data Analytics Tools

Descriptive and Diagnostic analytics rely on tools like SQL, Python, Hadoop, Oracle Database, Tableau, Microsoft Access, QlikView and R, SAS etc. Predictive analytics rely on SAS,SPSS,R, Python. Optimization tools like ILOG, Garrobi and RiverLogic, etc. Simulation tools like, STELLA,Vensim, AnyLogic,.

Use of Data Analytics in Healthcare Industry

1. Data Analytics can be used to study disease patterns and trends in a clinical trial and can optimize research and development of new drugs.
2. Using Claims analytics to effectively communicate how to manage or prevent a specific disease from occurring, diseases like diabetes can be prevented.
3. Analysis of patient history can help companies target populations with care and lifestyle changes.
4. Hospitals can use data analytics to improve the quality of care and treat chronic illnesses through ongoing patient monitoring.

Big Data refers to massive structured and unstructured data sets that are too complex for traditional relational databases to capture, manage or process the data.

Volume, Velocity, Variety, Veracity and Value are called the five Vs of big Data.

Various Types of Analysis

Cluster analysis is assembling a group of objects in a way that objects in the same group are more alike to one another than objects in other groups. It is required in market research from surveys and focus groups.

Decision tree analysis is used to help healthcare professionals considering different treatments along with the associated costs and the chance of success of the treatment given.

Analysis of a large number of independent and dependent variables is done with the help of Factor Analysis.

Regression analysis is done to establish relationship between a dependent variable and one or more independent variables.

Multivariate analysis is used to observe and analyse more than one statistical result variable at a time.

Segmentation analysis is used to divide a wide category into sub-categories that are known to have similar types, interests or characteristics.

Sentiment analysis is a procedure of labelling opinions expressed in text to determine the attitude of writer towards a topic or issue. Sentimental analysis determines if it is positive, negative, or neutral. This type of analysis relies on natural language processing .

A Simulation is imitation of a real-world process or system.

Time series analysis consists of methods for analysis of data which are collected over a period of time to draw out meaningful statistics. Stock prices, interest rates ,sales volumes, and quality measurements are all time series typical example.

Course 2: Problem Solving with the help of Excel

Course 2 explores Excel as a problem-solving tool. It consists of basics of Excel and how to navigate an excel workbook. Five concepts to keep in mind while working on excel are simplicity, traceability, consistency, adaptability and ease of use. The course covered data cleansing, data trimming, data validation, VLOOKUP, HLOOKUP, Index and Match functions and creating pivot tables.

Logical Functions

- Countifs
- Sumifs
- If + Then
- If + And
- If + Or
- Nested If functions.

Statistical Functions Excel can be beneficial to perform various statistical functions from basic to advanced. Some of the functions excel can perform are:

- Standard Deviation
- R-squared
- Variance

Financial Functions- Excel has become very efficient and powerful financial calculator that can perform various financial functions from

- Financial modelling
- stock analysis
- bond calculations
- Net Present Value
- loan repayment schedule
- Internal Rate of Return
- interest paid & saved.

Course 3: Visualization of Data with Advanced Excel

Data visualization in a nutshell which allows the data presentation in a picture or graphical manner to communicate information clearly and effectively to users.

Different types of charts in excel are bar or column chart, a line or pie chart, a Gantt chart, a heat map and a 100% stacked chart. Selecting the optimal chart for conveying your message is critical. The first step in this process is to determine what the message is. A heat map encodes values as colours, allowing for patterns to be identified more easily. A Gantt chart helps visualize related timelines. A 100% stacked chart displays relative proportions of multiple variables' contributions to a value.

Dashboard attracts the attention of users on the most important outlook of a dataset using principles of data modelling and visualization.

Some of the Benefits of using a dashboard are:

- Decreases the time spent by the users in understanding the data.
- Allows quick decision making
- Focus on aspects that require more attention

There are three main types of dashboards:

1. Executive
2. Analytical
3. Operational

Executive dashboard contains summary of information and usually covers data along long- time frame in order to communicate key trends or corporate performance.

Analytical dashboards are normally more detailed whereas Operational dashboards cover shorter timeframes to focus on specific goals.

Course 4: Effective Business Presentations with PowerPoint

The 8-step approach formulated by PwC to prepare an effective business presentation is as follows:

1. Know the audience
2. Know the purpose of the presentation
3. Structure the body of the presentation
4. Plan the start of the presentation
5. Plan the ending of the presentation
6. Prepare visual aids
7. Anticipate the questions that may be asked
8. Practice the presentation

Types of Decks

1. Proposal or Pitch deck
2. Status update deck.
3. Executive summary deck.
4. Full content deck or report findings.

Mode of Data Collection

Secondary method of data collection was used for the purpose of observational learnings. This includes identifying, gathering, sorting and organizing relevant data from the articles and research papers applicable to the study.

Sources of secondary data: Online Research

1. PubMed
2. Pan African Medical Journal
3. East African Medical Journal
4. Taylor & Francis
5. Commonwealth Fund
6. Lancet Global Health

Secondary research was carried out by searching for specific keywords related and relevant to the study. The abstract of the research papers was carefully studied to gather all the relevant data.

Limitations

1. Time constraint was faced since the duration of the summer training is limited to a period of two months.

2. Limited published articles and credible information on some niche topics such as rare diseases.

3. Working in remote setting due to the restrictions imposed due to lockdown measures.

4. Dearth of literature, articles, and published research papers in some of the less developed countries of Africa.

Part II: Project Report

Healthcare System and Disease Landscape: Market Analysis for Kenya

INTRODUCTION

1.1 Country Overview

Kenya is an eastern African country with Nairobi as the capital. Kenya has an estimated population of approximately 54 million. It is the fastest growing economy in the Sub-Saharan region. Kenya has made significant improvement in the economic development owing to its stable macroeconomic environment and growing investments in private sector over the last few decades. Kenya is considered a young country as about 38.71% of its population in the age group of 0-14 years, 20.45% in 15-24 years and only about 3.04% is above the age of 65 years. In terms of urbanization, only 28% of the population live in urban cities. The rate of urbanization is 4.23% annual rate. Kenya has a high fertility rate, as a result drastic population growth occurred since the mid-20th century. The rapid growth in population can be attributed to unmet need for family planning, low reach of contraceptives, early marriage, and childbearing. Only 60% of Kenyan women have access to contraceptives and abortion is still illegal. The keys challenges are poverty, climate change, inequality, healthcare accessibility, weak private sector investments and skills gap. Literary rate of Kenya was 81.5% (who are able to read and write and are aged 15 years or above). Sex ratio at birth is 1.02 males to 1 female. (1.02:1) and the life expectancy (69 years) is increasing due to increase in healthcare expenditure.

Kenya Vision 2030 is a long-term development plan aim to create high quality of life to its citizens and globally competitive country by 2030. The four pillars of Vision 2030 are sustained economic growth rate of 10% PA, equitable social development, accountable people-centric and results driven democratic system, macroeconomic stability and developments in infrastructure, human resources, science & technology, and innovations.

Big Four Agenda conceptualized by the Kenyan president prioritizes food security, affordable housing in clear and safe environment, accelerating development in manufacturing sector and affordable healthcare to all its citizens by 2030.

Kenya has the world's worst HIV/AIDS Epidemic, but the prevalence rates has drastically come down in the recent years. Kenya has made significant improvements in controlling malaria, TB, and HIV epidemic by the provision of health and sanitation services. Mortality from infectious diseases still remains a cause of concern and the threat from non-communicable diseases is adding to the burden on healthcare structure in Kenya.

Figure 1: Kenya on map of Africa

1.2 Health Indicators for Kenya

Mortality Indicators include life expectancy at birth, infant mortality rate, under-5 mortality rate and maternal mortality rate.

1. Life Expectancy at Birth
   Kenya's life expectance at birth in 2020 was 66.99 years, up from 66.7 years in 2019 (change of 0.44%).

2. Infant Mortality Rate (IMR)
   Kenya's Infant mortality rate is 31.9 deaths per 1,000 live births in 2019.

3. Under-5 Mortality Rate (U5MR)
   The Under-Five Mortality Rate in 2019 was 43.2 Deaths/ 1000 live births for Kenya.

4. Maternal Mortality Rate (MMR)
   The MMR for Kenya in 2019 was 362 Deaths/ 100,000 live births

5. Fertility Rate
   The current fertility rate for Kenya is 3.363 births per woman.

6. Crude Death Rate
   The Crude Death rate in 2019 was 5.39 per 1,000 mid-year population.

7. Immunization Coverage
   Immunization coverage of all childhood vaccinations stood at 70% for year 2016-2017

1.3Segmentation

The healthcare industry comprises of all the companies or entities that provide clinical services, drug manufacturing companies, medical devices and equipment, digital health providers and other health-related support services like medical insurance etc.

The aim is to provide preventive, therapeutic, diagnostic, and rehabilitative services to the patients or care seekers. The stakeholders are governments, healthcare providers, insurance companies, pharmaceutical companies, medical device companies and medical administrators. These companies have a role to play in management of illness, disease, or an injury.

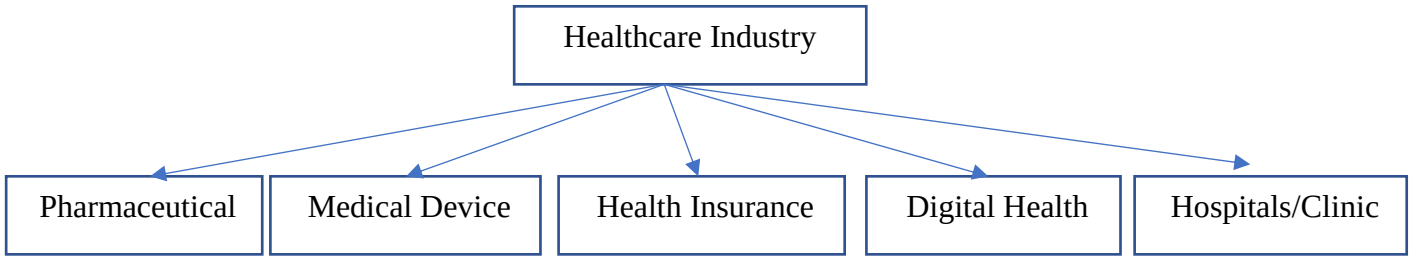


Figure 2: Segmentation of Healthcare Industry

1.4 Healthcare Value Chain

1. Administrative

The functions of the administrative office are planning, coordination and supervision of the day-to-day operations of healthcare facilities. The administration is also responsible for forming hospital policies, medical billing, hospital admissions and discharges, recruitment and staffing of the hospital etc.

2. Information Management

It is the collection and analysis of health data to help healthcare providers to make healthcare decisions to improve healthcare delivery.

3. Clinical Services

These are all the services required by the patients to treat a disease, illness, or injury. These include cardiology, neurology, gynecology, radiology, oncology and palliative care, oral surgery, and reproductive health etc.

4. Allied Health

Allied health offer rehabilitative services like physical therapy, occupational therapy, speech and audio therapy, psychology, dietary and nutritional services.

5. Support services

These include biotechnology and life sciences companies, procurement, supply, and distribution of life saving drugs, medical devices, and equipment.

1.5 Overview of the Pharmaceutical Industry in Kenya

Kenya and most African countries rely on imported medicines due to the low production capacity of the country. Almost 70-80% of the medicines consumed by the population of Kenya are imported from other countries, mainly from India and China. A Majority of branded drugs are imported from Europe. High growth is still attainable. The pharmaceutical market in Kenya was estimated to be worth $1 billion in 2018 and expected to growth at a CAGR of 7.6-12% over the next five years.

The market is majorly driven by the high burden of infectious diseases prevalent in the country like HIV/AIDS, Malaria, TB, Hepatitis B, Human Papilloma Virus, Diarrhea, Cholera and Meningitis etc. The country is also experiencing dual epidemic of Communicable Diseases as well as Non-Communicable Diseases (NCD). Kenya has witnessed dramatic rise in the NCD over the past few decades due to the rapid rate of urbanization, environmental factors, and increased exposure to risk factors such as consumption of alcohol, tobacco, smoking and drug abuse. Diabetes, Hypertension and Cancer are among silent killers in the Kenyan population.

Other market drivers include demographic factors like expanding population, high fertility rate and increase in the life expectancy due to improvement in the health outcomes of the patients suffering from infectious diseases.

Kenya is the largest exporter of pharmaceutical products to its neighboring countries like Uganda, Tanzania, and South Sudan.

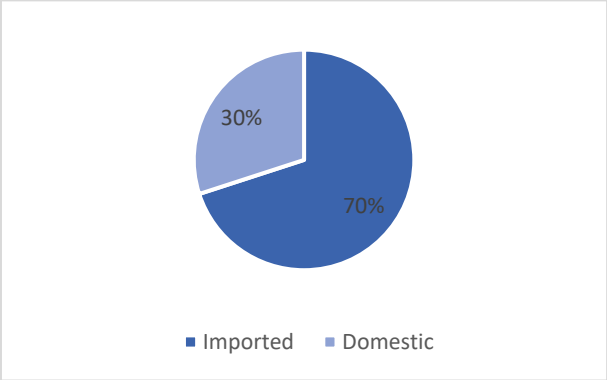


Chart 1: Market share (Imported, Domestic Drugs)

Generic medicines dominate the pharmaceutical market in Kenya due to its low-cost and about 66% of all the diseases managed are by generic medicines. Approximately 50% of the market share is controlled by anti-infectives (majorly antibiotics). Cardiovascular segment is the fast-growing followed by oral hypoglycemic drugs. Currently, Prescription-based drug segment is dominating the pharmaceutical market but high growth in the OTC segment is expected in the years to come. The supply chain of finished pharmaceutic products consists of private channels, public systems, and Non-Governmental Organizations (NGOs). The Kenya Medical Supplies Authority is the main government procuring body that distributes drugs to all the public hospitals, NGOs, and other Faith-Based Organizations.

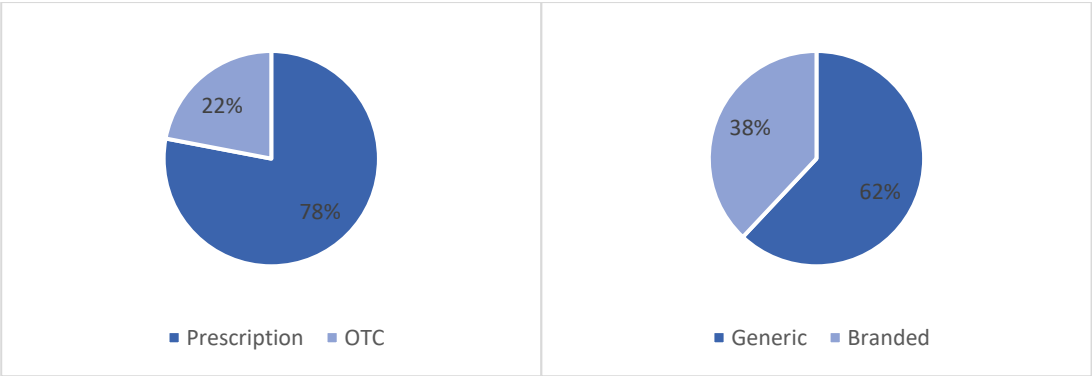


Chart 2: Market Share (Prescription, OTC) and Chart 3: Market Share (Generic, Branded)

The Pharmaceutical value chain comprises of the following activities:

- Research and Development (R&D)
- Manufacturing
- Distribution and
- Dispensing

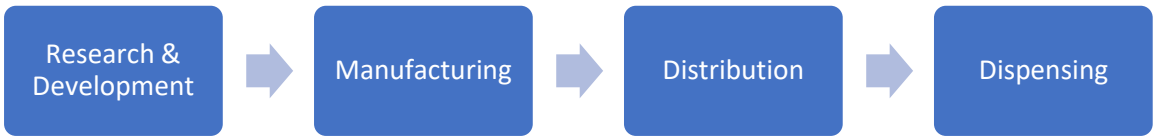


Figure 3: Pharmaceutical Value Chain

The Pharmacy and Poisons Board (PPB) is the main governmental body that regulates the manufacturing of the drugs by ensuring adherence to the Good Distribution Practices (GDP) by inspecting domestic and foreign pharmaceutical manufactures.

Key players

GlaxoSmithKline is the pharmaceutical multinational company supplying the largest share of over-the-counter medicines in the pharmaceutical market in Kenya. The reason is attributed to its highly competitive prices in the anti-infectives segment like amoxicillin and flucoxacillin.

There are only two WHO-Prequalified local pharmaceutical manufacturing companies in Nairobi. They are Cosmos Limited and Universal Pharmaceutical Corporation Limited.

Other leading manufacturers in pharmaceutical industry in Kenya are Dawa Limited, Regal Pharmaceutical Limited, Elys Chemical Industries Limited, and Beta Healthcare Limited.

1.6 Overview of the Health Insurance Sector in Kenya

In Kenya, Health insurance is provided by both government and private health insurance companies, though the coverage of insurance through private companies is limited to just 1% of the total population in Kenya. The National Health Insurance Fund (NHIF) is the main source of health insurance for majority of Kenyans. Approximately 16% of the population is covered through the National Health Insurance Fund. The NHIF provides both in-patient and out-patient benefits. The NHIF covers hospitalization bills, consultation fees and medicine costs and other allied health services.

Kenya lacks capacity to manage insurance related aspects and there is no clear and strong regulatory framework. The governing body for the regulation of health insurance in Kenya is the Insurance Regulation Authority (IRA).

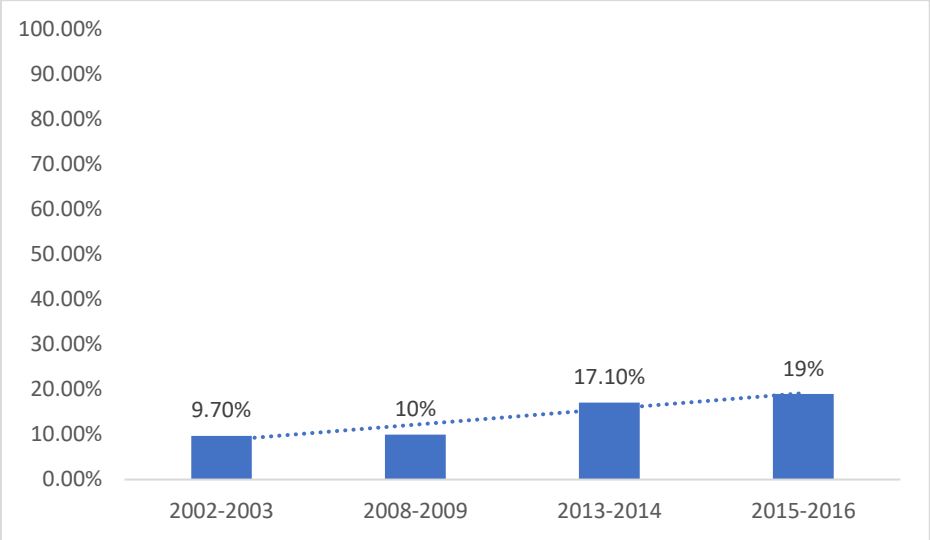


Chart 4: Insurance Coverage in Kenya

Health Insurance plans available in Kenya

- Hospitalization Plan- It covers cost for the treatment and bed charges during the hospital stay of a patient
- Family-Floater Health Insurance- Medical bills of two adults and two children in a family is covered in the plan
- Senior Citizen Health Insurance- Covers health expenses for elderly population aged above 60 years.
- Maternal Health Insurance- This plan covers hospitalization expenses of child-delivery and other new-born care medical needs.
- Critical Illness Insurance- It covers treatment costs for long-standing life-limited medical conditions like cancer, cardiovascular or neurological conditions.

OBJECTIVES

1. To study the healthcare system of Kenya
2. To understand the existing diseases burden in Kenya

RESEARCH QUESTION

1. How is the healthcare system in Kenya structured and what are the challenges of the healthcare system ?
2. What is the disease landscape in Kenya ?

RATIONALE

Kenya has the capacity to become a success story. It is a young country with approximately half of its population under the age of 20 years. It was a robust labour and human resource market, but the country has a weak healthcare system owing to less expenditure of GDP on health. Health outcomes have been improving since the past few decades and the country has made enormous progress in terms of controlling the spread of communicable diseases. Kenya's vision 2030 and big four agenda show a promising picture in the future for the country.

Limited published research articles on the healthcare system and disease landscape in Kenya makes a study like this a prime source of information and help students or researchers to gain a better understanding of the Kenyan healthcare system and disease profile in the country.

METHODOLOGY

5.1 Type of Study : Systematic Review

5.2 Type of Data : Qualitative Data

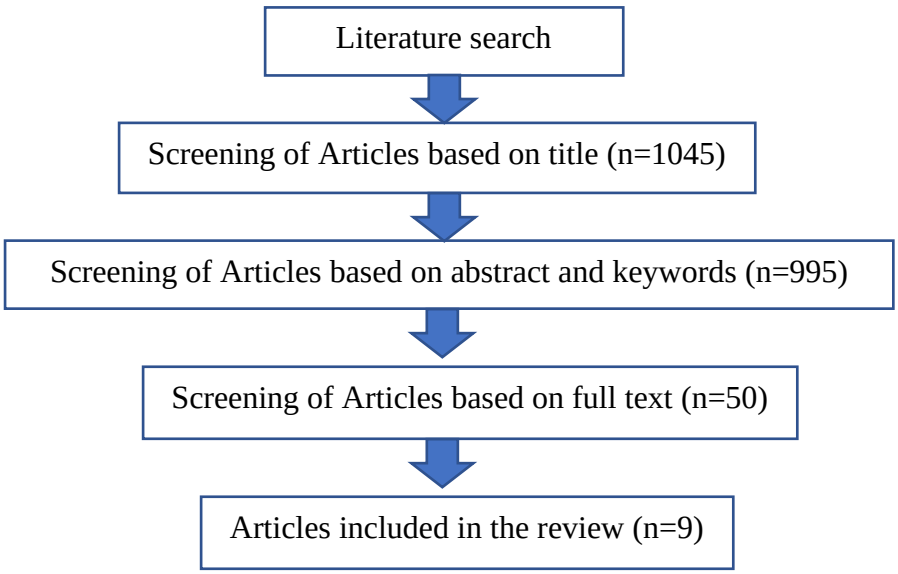
5.3 Study Technique : Secondary Research

5.4 Data Collection : An extensive research of data related to healthcare system of Kenya, pharmaceutical industry, disease burden, market growth drivers based on epidemiology of diseases and competitors in the industry was done. Data was collected from various research papers, articles and studies conducted by different organizations and universities in Kenya like Kenyatta National Hospital, Pan African Medical Journal, Lancet, Pub Med as well as Indian Institute of Health Management Research, Jaipur. Keywords used to search for the research papers included "Healthcare System", "Prevalence", "Incidence" "Pharmaceutical Market", "Insurance Coverage" and "Disease Burden". The search was restricted to English language. All the research papers were manually reviewed between the period of 2010 to 2021.

5.5 Inclusion Criteria : Descriptive studies conducted to determine the prevalence of diseases in Kenya, risk factors associated with the diseases, healthcare system of Kenya and pharmaceutical industry in Kenya were included. This systematic review will explore the studies carried in Kenya. Also, the study must mention one of the objectives in this systematic review.

5.6 Data Extraction and Analysis : The fundamental idea was to screen the abstract of the articles generated by the search and identify eligible studies based on the inclusion criteria. If the eligibility of the article was not clear from the title, then full text was obtained and assessed. The research materials were shortlisted based on the inclusion criteria. Cross referenced articles were searched and documented through analysis. The data collected from the eligible articles was tabulated in the form of a metric containing "Author name", "Year of publication", "Objectives", "Methodology" and "Results".

5.7 Flowchart of Methodology



ANALYSIS

Table 1: Literature review of included research articles on Healthcare System of Kenya

Reference country	Year of Publication	Authors	Study design	Results/Conclusion
Texas, USA	2018	Elise Catherine Davis, Terri Menser, Alondra Cerda Juarez, Lesley E. Tomaszewski and Bita A. Kash	Systematic Literature Review	There is an irregular distribution of hospital and primary healthcare structure in Kenya. The existing healthcare infrastructure struggle to provide even basic health amenities in the country. There is a serious scarcity of trained healthcare professionals and proper medical educational programs. Primary care is delivered in six levels. Considerable progress has been made to improve access to healthcare among the poor and underprivileged. Kenya spends only about 5% of the GDP on health care. Even the pharmaceutical industry lacks trained manpower and pharmacists. There is an overwhelming prevalence of infectious diseases in the country owing to its year-long tropical climate. Providing lucrative work opportunities to trained healthcare professions in the country to retain medical talent will ultimately lead to improved health outcomes for the diseases that has crippled the Kenyan healthcare system.
Bangladesh	2014	Mohajan Haradhan	Descriptive study	This study discusses in depth, health situation and existing disease burden in Kenya. This study identifies challenges faced by the Kenyan healthcare system that are as follows: inadequate health financing by the government, frequent outbreaks of infectious diseases like malaria, cholera and yellow

				fever, severe dearth of healthcare human resources, inequalities in the distribution and utilization of health services, limited capacity for local production of pharmaceutical products and low awareness and stigma in general population towards diseases especially among women, rise in risky activities like alcohol consumption, unprotected sexual activities among adolescents in Kenya. The health sector in Kenya is heavily dependent on private healthcare providers which is often an expensive option for the poor in the country. The coverage of insurance is comparatively low and the cost of travelling to health facilities is among top reasons why most Kenyan are deprived of basic healthcare.
Kenya	2011	Jane Chuma and Vincent Okungu	Literature Review	This study examines the health financing in Kenya. The hector sector in Kenya relies heavily on out-of-pocket expenditure that financially drains the poor households of Kenya. More than half of the population of Kenya is living below-the-poverty line. Those insured under the national insurance scheme called National Health Insurance Fund covers a small portion of specialty services like oncology, cardiology, and neurology. The NHIF is mandatory for formal sector employees and others on voluntary basis. Population insured by private insurance companies stands at mere 1% and only people in urban cities and rich have health insurance provided by private companies. All Kenyans can have access to health care services in the public health institutions under control of Ministry of Health if they can

				pay user fees. The user fee is waived for some of the services like maternity services, under five child health services etc. 70% of the Kenyans still rely on tradition and herbal medicine from traditional healers before they seek proper medical care from physicians or nurses. Development of Vision 2030 has led to significant progress to attain Universal Health coverage and Millennium Development Goals for the country.

Table 2: Literature Review of Included Research Articles on Disease Landscape of Kenya

Reference country	Objectives	Authors	Disease	Study design	Results/Conclusion
London, U.K, and Nairobi (2015)	To determine the prevalence of malaria	James Kingora, Rachel Jenkins, Peter Sifuna, Linnet Ongeri, Raymond Omollo, Bernhards Ogutu and Michael Ongecha, Caleb Othieno	Malaria	Random Sampling, (n=1,190), Survey conducted in malaria endemic area in Kenya	The prevalence of malarial parasite in the blood samples of adults in area which was declared as an epidemic site for malaria was found to be 28%. The presence of such a high percentage of malaria parasites within the population of the Kisumu county suggests that reservoir of the parasite exists and that women were at 50% greater risk than that compared to men.
Nairobi, Kenya (2016)	To estimate the prevalence and incidence of HIV/AIDs in Kenya	Kimanga et al.	HIV/AIDs	Cluster sampling survey conducted in two phases in people aged 15-64 years in 9 regions in Kenya	The prevalence of HIV in Kenya has been declining progressively since 2017 due to the increased governmental support, donor funding from international organizations. Serologic sample of this study was 11,626 who consented to give their blood sample for HIV testing. The prevalence was found to be 5.6% and incidence stood at 0.5% in the study. Women were found to be at great risk of contracting the virus

					and the prevalence peaked at 35-39 years of age.
Birmingham U.K, (2013)	To study prevalence, complications, risk factors, knowledge, and awareness towards diabetes in Kenya	Tiffany L.E. Jones	Diabetes Mellitus	Descriptive Study	This study examines the risk factors and knowledge towards diabetes among Kenyan population. Low levels of awareness and knowledge towards diabetes was documented among the general population of Kenya. Poor attitude and behavior towards life-style changes to control diabetes was reported. The prevalence of diabetes mellitus as estimate by WHO, is 3.3%. By 2025, the prevalence is expected to rise to 4.5 %.
Nairobi, Kenya (2018)	To determine prevalence of TB (Pulmonary Tuberculosis)	Masini Enos et al.	Tuberculosis	Cross-sectional study	Tuberculosis is among the top 10 causes of death in Kenya. This study attempts to determine the prevalence of pulmonary tuberculosis from the National TB prevalence survey conducted in 2016 in adults aged above 15 years. The survey revealed that the prevalence was much higher than the estimated number. It came out to be 558 per 100,000 population.
Nairobi, Kenya	To determine prevalence & risk factors of hypertension	Joshi et al.	Cardiovascular diseases	Cluster sampling (n=2061)	Hypertension is the most common among cardiovascular diseases in the Kenyan population. One is

					four suffer from hypertension and approximately half are unaware of the condition. This study chose the informal settlement in Kenya as their study setting as the people living below the poverty line are unaware of their disease. The prevalence was found to be 22.8% and alcohol consumption was reported to be the risk factor associated with raised blood pressure.
Indianapolis, USA and Eldoret, Kenya	To improve access to case, training professionals and diagnosis of sickle cell disease in Kenya	Christopher M. Wanjiku and Anne Greist	Sickle Cell Disease	Descriptive Study	SCD along with malaria and diarrhea are significant contributors to under-five deaths among children in Kenya. This study mentions the prevalence of SCD at 4.5% and 18% children with sickle cell trait are born every year in Kenya. The high deaths result from low awareness, education gaps, late diagnosis, and inaccessibility to medical attention.

DISCUSSION

7.1 Healthcare System of Kenya

The Healthcare system in Kenya relies on governmental, private providers, non-governmental organizations, and faith-based organizations to provide healthcare services to the population of Kenya. Almost half of all the health facilities (48%) is owned by the government under the Ministry of Health (MoH). The private sector accounts for a major chunk (41%) and the rest are shared between NGOs (8%) and Faith-Based Organizations (3%).

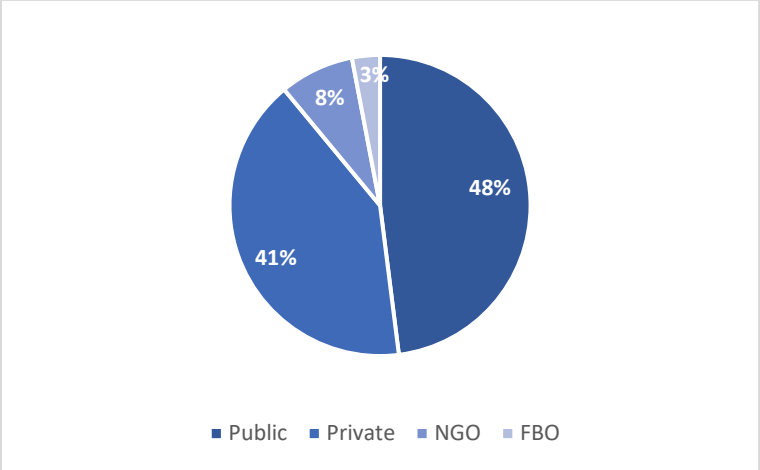


Chart 5: Distribution of different sectors in healthcare system of Kenya

It has a hierarchy of six levels community services, dispensaries and clinics being at the bottom of the structure and national-referral hospitals at the top. Kenyatta National Hospital, located in Nairobi is the apex referral hospital in the country together with the Moi Referral and teaching Hospital located in Eldoret.

Most of the large private hospitals are located in the major cities of Nairobi, Kisumu, Mombasa and Eldoret. Aga Khan Hospital and the Nairobi Hospital are the equivalent large privately owned hospitals in the country.

The six levels of care are as follows:

- Level 1- Community Services
- Level 2- Dispensaries and Clinics
- Level 3- Health Centers, Nursing and Maternity Homes
- Level 4- Medium sized privately owned hospitals and Sub-County Hospitals
- Level 5- Large privately owned hospitals and County-Referral Hospitals and
- Level 6- Large privately owned teaching hospitals and National-Referral Hospitals

Level 1 and Level 2 facilities provide primary health care services and are the first point of contact with the healthcare system in Kenya.

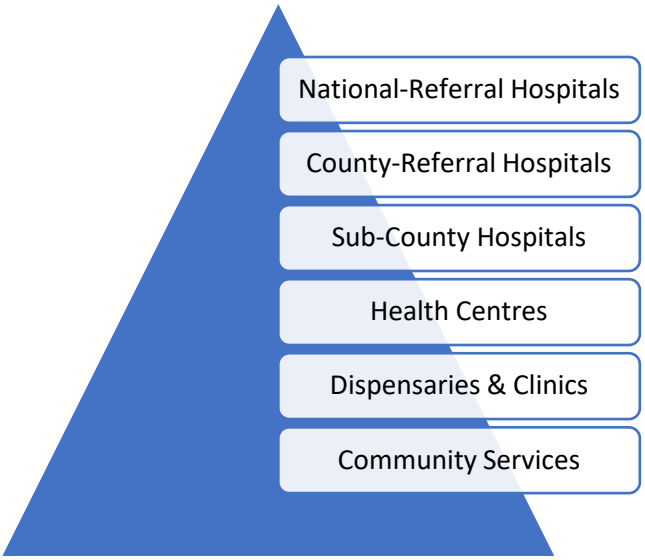


Figure 4: Kenyan Healthcare System

Regulation at all the levels is the function of health regulatory agencies/bodies in Kenya. Some of the regulatory agencies are KMPDB (Kenya Medical Practitioners & Dentists Board), NCK (Nursing Council of Kenya), PCK (Physiotherapists Council of Kenya), and COC (Clinical Officers Council).

Type of Health Facility	Number of Facilities	Percentage (%)
Ministry Of Health	5,177	47.5%
Other Public Institutions	100	0.9%
Private Sector	4,293	40%
NGOs	1,004	8%
FBOs	327	3%
Total	10,901	100%

Table 3: Distribution of Health Facilities in Kenya

The healthcare system of Kenya faces many challenges like high attrition rates among trained medical professionals in the country in the existing critical shortage of doctors and health care workers. Approximately 40% medical workers leave country due to lack of growth opportunities in the country.

Health Workforce	2013	2020
Doctors	3,443	6,051
Nurses	34,381	54,564
Clinical Officers	7,043	16,021

Table 4: Health Workforce Distribution in Kenya

*Number of health workforce for 2020 are projections based on data for 2013

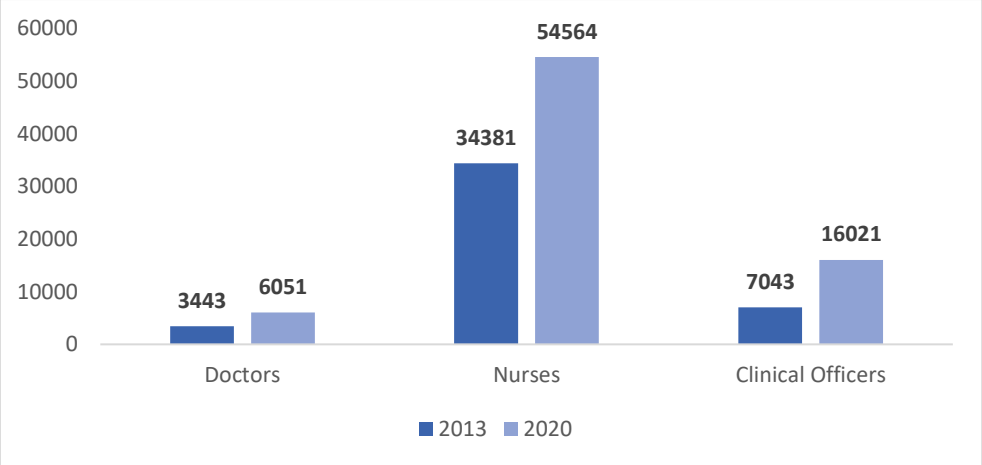


Chart 6: Health Workforce In Kenya

Health Financing

The government of Kenya has invested in the healthcare expenditure from Ksh73 billion to Ksh83 billion for the year 2020.

Health Expenditure	Percentage of expenditure
Public Expenditure on health	61.3%
Out-of-Pocket Expenditure	26.1%
Health Insurance	11.7%

Table 5: Total Health Expenditure

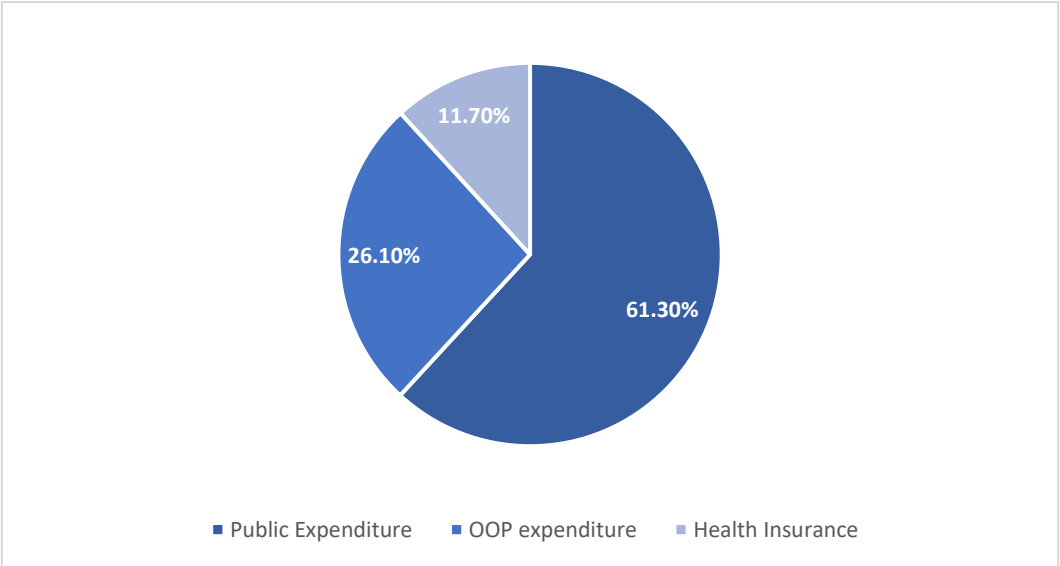


Chart 7: Percentage of Health Expenditure

7.2 Disease Landscape of Kenya

Kenya is fighting dual battle in terms of existing epidemic of infectious diseases and rapid rise in the Non-Communicable Diseases (NCD) like cardiovascular diseases, cancer, and neurological conditions. Adding to the burden, covid-19 pandemic that began in November 2019 has further pressurized the healthcare system in Kenya.

Cancer

Cancer is among the leading cause of deaths among both men and women is Kenya.

Top 5 cancer deaths in women are due to:

- Breast Cancer
- Cervical and Uterus Cancer
- Esophagus Cancer
- Colorectum and
- Ovarian Cancer

Top 5 Cancer occurring in men are due to:

- Prostate Cancer
- Esophagus cancer
- Colorectum
- Non-Hodgkin lymphoma and
- Stomach cancer

Cancer	**Incidence, No. of New Cases (2020)**
Breast Cancer	6799
Cervix-uteri	5236
Prostate	3412
Esophagus	2974
Non-Hodgkin Lymphoma	1798
Stomach cancer	1781
Ovarian Cancer	1126

Table 6: Cancer Incidence in Kenya

Malaria

The government of Kenya is taking measures to control malaria. The National Malaria Control Strategy includes key interventions include vector control program, distribution of mosquito nets, vaccination against malaria, strengthening healthcare infrastructure and health workforce for diagnosis and treatment of malaria. Kenya has also received donor funds from US, UK, WHO, UNICEF and Kenya red cross society.

HIV/AIDs

Approximately 1.5 million people in Kenya are living with HIV/AIDs. The prevalence of HIV has been steadily going down in the past few decades. This can be attributed to increase in level of awareness, positive attitude towards public health and rigorous initiatives taken by the government. The government is providing free anti-viral drugs to

population who are at high risk of developing AIDS and increase in screening facilities. AIDS is found to be highly prevalent in individuals who inject drugs, engage in unprotected sexual intercourse with infected partners, sex workers, and homosexual men.

Tuberculosis

Pulmonary Tuberculosis is caused due to a bacterial infection. The infection spreads through direct contact with droplets from sneeze or cough by an infected person. The high prevalence of TB is also correlated to existing high burden of HIV/AIDS. Kenya has become the first country in Eastern Africa to reach targets for both case detection and treatment of TB.

Diseases		**Prevalence**
Non-Communicable Diseases		
Diabetes		3.3%
Hypertension		22.8%
Chronic Obstructive Pulmonary Disease		13.4%
Asthma		3-28.6%
Diabetic retinopathy		35.9%
Obesity		9.1%
Sickle Cell Disease		4.5%
Osteoporosis		24.3%
Glaucoma		4.3%
Osteoarthritis	Knee Hip Hand	15% 3% 5%
Communicable Diseases		
HIV/AIDs		4.7%
Malaria		28%
Hepatitis B Infection		5%
Diarrhea		18.7%

Table 7: Common Diseases in Kenya and Prevalence Rates

Diabetes and Hypertension

A large proportion of the Kenyan population remains undiagnosed for diabetes. The cost of insulin in Kenya is too high for the poor to afford. Also, diabetes requires long term adherence to medication and specialist care. An increasing case of hospitalizations in tertiary clinics have been reported with complaints of foot ulcers caused as a result of poor glycemic control. The National Diabetes Strategy aims at strengthening health system for treatment and prevention of diabetes. Hypertension is the most

CONCLUSION

Kenya has a difficult health landscape with the burden of infectious diseases as well as NCDs like hypertension and diabetes. Adding to the prevailing challenges the health system now also faces Covid-19. Tackling the burden of diseases presents many difficulties especially when the country has a limited infrastructure, skilled human resources and doctors at hand. There remains insufficient funding for the implementation of strategy for managing, prevention, and promotion of health in the country. Lack of awareness among the general population, cultural beliefs and stigma create obstacles in overcoming the challenges of health access in Kenya. The financial strain from seeking medical treatment hinders Kenya's achievement of Universal Health and Vision 2030. Funding needs to be focussed on public health and primary healthcare centres. Change in population behaviours to take up healthy lifestyles will prove to be crucial in improvement health situation. Vaccination and immunization coverage in children needs to be increased to reduce under-five mortality rates in the country. The purchasing power of the population has been increasing, this will enable people to spend sufficient amounts on proper medical care and treatment. In the study it was observed that health care facilities in Kenya are far below the recommended numbers in the health sector. An effort to increase social consciousness and reduce the stigma related to some diseases will prove beneficial to prevent malaria, HIV, TB and other infectious diseases. The government needs to invest aggressively in public health institutions and increase partnerships with not-for-profit private organizations that are working to improve health conditions of the Kenyan population. Some of the long- standing challenges in the health sector such as low quality of medicines and counterfeit drugs in the market, corruption and high cost of treatment that pushes the population to dangerously self-medicate further deteriorating the situation needs to be addressed.

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