RELATIVE INFLUENCE OF FACTORS AFFECTING PHYSICIAN PRESCRIBING DECISIONS IN NAIROBI COUNTY

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DECLARATION

I hereby declare that this is my original work and has not been either previously assessed or approved for an award of degree in other institutions of higher learning. To the best of my knowledge and belief, the project does not include any material previously published by any scholar except where due acknowledgement is made.

Cynthia Omina Kanda

Sign: 

Date: 25th November 2023.

The thesis of Cynthia Omina Kanda is hereby submitted for examination with my approval as the University Supervisor.

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Sign:

Date: 25th November 2023

ABSTRACT

Over the past few decades, the overall healthcare expenditure and particularly towards medication has increased quickly in many countries. The consequence of this is reduced access to treatment especially for non-communicable diseases. To address the rising expenditure on medication, lower priced high quality generic medication have been considered. However, their use remains below expectation with previous literature attributing this to physician prescribing patterns. The current study used empirical methods to determine the comparative effect of these factors on generic prescribing of antihypertensives among physicians practicing in Nairobi County. The study applied the theory of planned behavior. It identified intention as a major factor in prediction of behavior occurring from subjective norms, attitudes, and perceived behavioral control. The correlational study design was applied to measure the relationship between the independent and dependent variables, with nonprobability sampling being used to recruit physicians. The population targeted were all physicians working in Kenya. Primary data was gathered using web-based questionnaires. The data that was collected and analyzed using quantitative methods, descriptive statistics, inferential statistics and SPSS. The factors affecting physician prescribing habits were assessed using spearman ranked correlation and logistic regression analysis. In addition, different percentages for each factor were compared using the Chi square test. The study findings established that physician, product, pharmaceutical, environmental and payer factors positively influenced prescribing behavior. The study also concluded that there was no relationship between patient factors and physician prescribing behavior of anti-hypertensive medication in Nairobi County. The main recommendation was to consider all factors as they affect prescribing behavior of anti-hypertensive drugs. Finally, the study recommended that physician knowledge enhances their experience, therefore hospitals should invest in providing opportunities for empowerment. The study had some limitations in that it was only done in Nairobi County and did not involve other Counties in Kenya. Moreover, only physicians were targeted mainly consultants, medical officers and interns and did not involve other non-physicians that provide clinical care especially in the primary healthcare setting.

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LIST OF ABBREVIATIONS

CME: Continuous Medical Education

GDP: Gross Domestic Product

HTN: Hypertension

IMS Health: Intercontinental Medical Statistics Health

INN: International nonproprietary name

INRUD: International Network for Rational Use of Drugs

LMICs: Low- and Middle-Income Countries

NCD: Non-Communicable Disease

OECD: Organization for Economic Co-operation and Development

OOP: Out of Pocket Payments

QPMP: Quality Procurement Management Policies

SSA: Sub-Saharan Africa

UHC: Universal Health Care

U.K: United Kingdom

U.S: United States

WHO: World Health Organization

WHO/HAI: World Health Organization/ Health Action International

DEFINITION OF TERMS

Generic medication: A pharmaceutical drug intended to be replaceable with the originator brand. It is manufactured without licensure from the original manufacturer. Its marketing is done after patent expiry or the expiry of other exclusivity rights (WHO, 2012).

Patent: A right granted by a government to an inventor of a product in exchange for the publication of the invention. This prevents any third party from using the invention for an agreed period of time (OECD/European Union, 2008).

Originator branded medication: This is a drug that was first approved worldwide for sale as a patented product based on its efficacy, quality and safety profile as per the requirements at authorization (WHO, 2012):

Hypertension: Rise in blood pressure (>140/90 mm Hg) of no known cause increasing the risk for cardiac, cerebral, and renal events (Messerli et al., 2007).
Anti-hypertensive: Refers to a drug used to prevent, control, or treat hypertension (WHO, 2012).

Physician: Doctors with a degree in medicine trained to provide primary health care services (WHO, 2012).These would include medical interns, medical officers and consultants.

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I would first with to appreciate God for his mercy and enabling me to go through my master's program and undertake this study. Second, I would like to recognize the immense support given by my supervisor Dr. Ben Ngoye without whom this would never have come true. I truly appreciate his patience and consistency. Third, I do express my appreciation to my immediate family for creating a conducive environment for my studies. Finally, special appreciation to my syndicate group members.

DEDICATION

I dedicate this work to my youngest daughter Samara whom I had to bring up concurrently as I pursued this degree.

CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 Background of the Study

In recent years, health care costs have increased all over the world as a percentage of GDP. In 2017, the healthcare expenditure as a proportion of the GDP was 6.3% globally, 5.7% in Africa and 4.8% in Kenya (GHO, 2016; WHO, 2018; World Health Organization, 2019). Pharmaceuticals account for a greater proportion of these healthcare costs. In developing countries, medication cost accounts for 20% to 60% of the overall healthcare costs (Cameron et al., 2009).

This high cost of medication is a threat to achieving universal health care (UHC). This is due catastrophic health expenditures since most patients make out of pocket (OOP) payments (WHO, 2004a). In 2016, OOP accounted for 28% of payments in Kenya (MoH Kenya, 2019). A major element of the UHC strategy for essential medicines to ensure access is understanding the available options of medication to select from and their impact toward the overall healthcare expenditure. These may either be through prescribing branded medication or generic medication.

Branded medication are those that are originally discovered and marketed by a pharmaceutical company. Once the medication is approved, the innovator company sells it as a patented product, exclusively for a specified period, mostly 20 years. On expiry of the patent, the drug can be turned into a generic drug by other companies. The generic drug is expected to be therapeutically bioequivalent to the branded drug. This means that they contain similar active ingredients, dosages, concentration and follow a similar route of administration as branded medication. It may however vary in color, shape, taste, preservatives, inactive ingredients, and packaging. Generic medication have two versions, branded and authorized generics. Authorized generics are identical to branded medication but sold as a generic version without the brand label increasing affordability. They are sold by both the innovator company or other permitted subsidiary company but have to undergo Food Drugs and Cosmetic Act (FDA) approval.

On the other hand, branded generics are not under any patent and marketed as the brand name and not the chemical name. They are manufactured either by the original manufacturer or generic drug firm after expiry of patent of the original medication.

Branded generics are marketed by both generic and innovator companies while authorized generics are only sold by innovator companies. They do not undergo FDA approval as they are expected to be manufactured on a similar production line and can be launched even before patent expiry.

Generally, the costs by the company's manufacturing generic drugs are lower and therefore making these drugs more affordable. Therefore, the promotion of use of high quality generic medication is encouraged (Barasa et al., 2017). This strategy is aimed at improving the health system by increasing access and improving treatment outcomes. However, the manufacturing of these medications must be regulated to avoid counterfeiting. These regulations and oversight are poor in developing countries due to weak structures leading to counterfeit medication. A counterfeit drug may deliberately and fraudulently have the right ingredients with forged packaging, wrong ingredients, inactive ingredients, or inadequate active ingredients to look like a legitimate product. This can happen to both branded and generic medication.

Literature shows variation in prescribing patterns of generic medication. This is driven by factors such as the availability of the drugs, government regulations, bioequivalence requirements and expectations by patients (Chawla, 2014). To accommodate the healthcare expectations of patients, physicians should provide prescriptions that would meet this demand. Variation in the practice behavior of physicians has a significant impact on health care costs. These decisions are because of multiple factors such as their educational background, working environment, expectations of their patients and so on. Therefore, understanding these factors is key as they are central to policy development to advise the regulation of the pharmaceutical industry. Furthermore, the significant role of physicians makes further understanding of the factors that influence their prescribing decisions of significant worth. It would be useful to further understand the intricacies of prescribing medication from different geographical perspectives.

1.1.1 Generic Medication from a Global Perspective

Globally, the use of generic medication varies among countries. For example, in Europe the use of generic medication accounts for 92% of the overall pharmaceutical treatment (Frost & Sullivan, 2018). This is facilitated by policies which affect demand and supply through price ceilings and free market adjustment (Chawla, 2014). Moreover, in the UK physicians are limited by the spending budget which incentivizes them to reduce costs (Bateman et al., 1996).

Germany had physician budgets which were meant to control pharmaceutical costs. However, these were abolished in 2001-2002 due to non-implementation of penalties (Himmel et al., 1997; Schreyögg et al., 2004). On the other hand, Canada's fixed price policy reduces cost by having a ceiling on generic drugs. Other strategies include introduction of full reimbursements to pharmacies offering lower priced generic medication (Chawla, 2014).

Contrary to the above, the US has no price controls resulting in varied prices and eradication of monopoly. In addition, the 1984 Waxman-Hatch Act encouraged market penetration of generic medication on expiry of the patent (Chawla, 2014). Furthermore, the US has policies which allow substitution of medication and provision of higher reimbursements for generic drugs (Garattini & Tediosi, 2000; Håkonsen & Toverud, 2012; Huttin, 1996; Kolassa, 1997).

1.1.2 Generic Medication from a Regional Perspective

Literature shows a 70-80% increase in the generic market share in South Africa (Kaplan et al., 2013). In addition, Egypt, Algeria, Morocco, Nigeria and Kenya saw a 22.3% growth of generic market share between 2004 and 2011 (Page, 2020).

Similarly, Uganda has an 85% prevalence of brand to generic drug substitution (Nabbale, 2014). This has been facilitated by adoption of policies which facilitate market penetration, prescribing and substitution (National Drug Policy and Authority Act, 1996). However, there is poor policy regulation resulting in an increase in the supply of poor quality and falsified medication (Antignac et al., 2017;Caudron et al., 2008).

1.1.3 Generic Medication in Kenya

In 2017, the generic market share in Kenya was at 64% and was expected to grow further by 10% (Ministry of Health Kenya, 2010). 70% of these medication are intended to treat non-communicable diseases(NCDs) (Ministry of Health Kenya, 2010). Similarly, as in other countries in SSA there is a challenge in implementation of these policies, more so in the private health sector (Ministry of Health Kenya, 2010).

The high costs of medication globally call for a need to ensure access to treatment, Moreso for management of chronic diseases, hypertension being one of them. This is because of the long-term nature of treatment which has an impact on the overall cost of treatment. Previous studies have also shown that physicians have a significant role in the prescribing patterns. In view of this, there are notable differences in the physicians prescribing patterns of medication as driven by different factors (Grytten & Sørensen, 2003; Jain, Elon, Johnson, Frank, & DeGuzman, 2010). Therefore, it is necessary to focus on understanding the relative influence of each of these factors to physician decision making with a focus on lower priced generic medication. This would aid in developing a systematic approach to rationalizing patient care processes and healthcare expenses.

1.2 Problem Statement

In 2001, the global expenditure on healthcare costs accounted for 9% of global GDP (WHO, 2004b). However, LMICs which account for 82% of the global population and 92% of the disease burden only spent 12% of this amount (Mathers et al., 2002). This disproportionate funding has resulted in catastrophic healthcare expenditure as households have had to make OOPs for health care services. In addition, those who have been unable to afford the OOPs have suffered poor health, further impacting on income and economic growth. This compromises the achievement of the goals for health for all, fairness, and equity in the financing of health care systems. The pressing need for comprehensive policy solutions is highlighted by the intricate nature of the financial access problem. The lessons from countries that have achieved universal coverage show that the health care funding model has to be skewed towards public spending (taxation and social health insurance) while reducing OOPs. For public financing to be sustainable, policy decisions such as reduction of the cost per visit are necessary. One of these

solutions is through use of high quality but low cost generic medication (Cameron et al., 2009).

Typically, new drugs are launched under patent as branded medication and may be costly until expiry of the patent then more affordable generic medication emerge. While use of more affordable bioequivalent generic medication has been discussed widely, their use is largely shaped by government policies and consumer and physician decision making. Several countries don't benefit from lower priced generics because of lack of effective competition or poor policy regulation. As such, policy regulations have been developed to create financial access to medication. An example of this is the flexibility under the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement that enables countries to access to patented medication (WHO, 2015). TRIPS enables access to generic medication through compulsory licensing, parallel importation and exception for research exception ('t Hoen et al., 2018).

Kenya conducted a WHO/HAI survey on pricing in 2004. The survey showed that the mean availability of originator medicines in the private and public health sector was 81% and 66% respectively. In addition, the median availability of generics medication was 37.7% and 72.4% respectively (WHO, 2004a). A study done by Ongarora, et al revealed that branded medication were 13.8 times more costly than generic medication (Ongarora et al., 2019). To facilitate the use of generic medication, Kenya has legal provisions which govern the licensing and prescribing practices. However, compliance rate to prescribing by INN stands at 31.8%. Further, substitution of generic equivalents during dispensing is acceptable both in public and private sector facilities.

The contribution by NCDs to the disease burden and mortality and poses a significant threat to the health systems and growth of the economy. This is through reduction of productivity and human capital economies by the related direct and indirect costs. In addition, their chronic nature and the associated costs for long term care can cause catastrophic healthcare expenditure resulting in further poverty and inequality(van Mourik et al., 2010). The prevalence of NCDs in LMICs has been increasing with diabetes, cancers, cardiovascular diseases and chronic obstructive pulmonary disease being most common(WHO, 2014). This prevalence is one of the major limitations towards achievement of UHC.

Hypertension is the leading cause of NCD related mortality in Kenya, however the rates of those on treatment are still low (Hendriks et al., 2012; Lu et al., 2011; Mathenge et al., 2010; Van De Vijver et al., 2013). This is partly attributed to the high cost of medication, ranging from $26 to $987 annually (Subramanian et al., 2018). More often, people with hypertension who are on treatment may be on more than one regimen of medication, further resulting in increased health care costs. In response to the morbidity and mortality associated with hypertension, it's important to implement strategies to increase access to affordable medication.

There are notable variations in the prescribing patterns of either branded or generic antihypertensive medication among physicians (Jain, Elon, Jo Inhnson, Frank, & Deguzman, 2010; Ketcham et al., 2007). This is because of concerns regarding clinical superiority of branded medication to generic medication impacting on clinical outcomes. Therefore, the decision making on what type of medication has been largely left to physicians who would be better placed to make the decision on what medication would be best for their patients. However, the physician prescribing decisions are further attributed to physician, patient, environmental, pharmaceutical and payer related factors (Davari, Khorasani, & Tigabu, 2018a; Sharifnia et al., 2018; Wazana, 2000). These factors may have varying influences in different settings.

Previous research has focused on looking at the factors that affect physician prescribing decisions such as the quality of medication, loyalty to the prescription, costs, physician knowledge and how prescriptions are done(Joyce et al., 2011; Kucukarslan et al., 2011; Mehralian et al., 2016, 2017). However, it's unclear whether isolated measurement of these variables clearly illustrates the prescribing decisions. In addition, no study has been done in Kenya to understand the extent to which of each of these factors affects physician's prescribing decisions (Aaron & Ginsburg, 2009; Bodenheimer, 2005). Our focus therefore was the extent to which these factors affect physician prescribing decisions for generic antihypertensives Kenya. These were of interest as there is notable increase in their prevalence, disproportionately to the rest of the world (Subramanian et al., 2018). This study used empirical evidence to identify the relative influence of these factors on physician's decision making of prescribing generic or branded antihypertensive medication in Nairobi County. An understanding of this would be

important to healthcare stakeholders and help develop policy interventions around cost containment. The study was conducted in Nairobi County, but also developed interest across other counties to develop long term plans for increased uptake of generic medication.

1.3 Research Objectives

1.3.1 General Objective

i. To determine the relative influence of product, physician, patients, payers, environmental and pharmaceutical related factors on the prescribing of generic antihypertensive medication among physicians practicing in Nairobi County.

1.5.1 Specific Objectives

i. To determine the relative influence of product related factors on the prescribing patterns of physicians practicing in Nairobi County.
ii. To determine the relative influence of physician related factors to the prescribing patterns of physicians practicing in Nairobi County.
iii. To determine the relative influence of patient related factors to prescribing patterns of physicians practicing in Nairobi County.
iv. To determine the relative influence of payer related factors to prescribing patterns of physicians practicing in Nairobi County.
v. To determine the relative influence of environmental related factors to prescribing patterns of physicians practicing in Nairobi County.
vi. To determine the relative influence of pharmaceutical related factors to prescribing patterns of physicians practicing in Nairobi County.

1.4 Research Questions

i. What is the relative influence of product related factors on the prescribing patterns of physicians practicing in Nairobi County?
ii. What is the relative influence of physician related factors to the prescribing patterns of physicians practicing in Nairobi County?
iii. What is the relative influence of patient related factors to prescribing patterns of physicians practicing in Nairobi County?

iv. What is the relative influence of payer related factors to prescribing patterns of physicians practicing in Nairobi County?
v. What is the relative influence of environmental related factors to prescribing patterns of physicians practicing in Nairobi County?
vi. What is the relative influence of pharmaceutical related factors to prescribing patterns of physicians practicing in Nairobi County?

1.5 Scope of the study

The research focused on determining the relative influence of these factors on physicians prescribing decisions of generic antihypertensives. The study targeted physicians practicing in Nairobi County. Many of the physicians were specialist consultants, general practitioners, and medical interns. The nonprobability sampling method was used to pick out samples of specialist consultants, general practitioners and medical interns who were the respondents in this study. The study was done within a timeframe of three months from March 2021 to September 2022.

1.6 Significance of study

The study was done for academic purposes to provide better understanding of the relative influence of products, physician, patients, payers, environmental and pharmaceutical related factors to physician prescribing habits. This will help guide the formulation of standard treatment protocols, policy formulation and control patient costs. Apart from its academic purpose, this research is of great benefit to healthcare workers, pharmaceutical industry, academicians, and researchers.

The study was aimed at providing a better understanding of factors driving the prescribing generic medication. Moreover, it is purposed to encourage physicians to prescribe affordable but high-quality generic medication. Finally, this would also impact the practice of pharmacists in that they would consider substituting branded by generic medication to manage healthcare costs.

This study was expected to impact on the operations of companies producing branded medication and advise newer strategies to remain competitive within the Kenyan market. It may also empower generic companies with strategies to penetrate the market. Additionally, academicians and researchers shall benefit from this study as learning

material on the existing gap of the weighted effects of each factor on physicians prescribing decisions. They may also use these findings for future reference when researching on related topics.

1.7 Chapter Summary

Chapter one of this research has been premised on the systematic deconstruction of the study variables. The chapter starts by providing a background, followed by unpacking of the global, regional, and local perspectives with respect to generic antihypertensive. The chapter also includes a statement of the problem, research objectives, research questions, scope, and significance of the study.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

This chapter shall cover cognitive theories which will contribute to the study by providing insight into the extent to which the product, physician, patients, payers, environmental and pharmaceutical related factors affect the prescribing decisions. It shall also include the conceptual framework which explains the association between the factors and prescribing decisions of generic medication by physicians. Finally, it shall have a gap analysis of what this study is intended to address.

2.2 Theoretical Review

Three theoretical perspectives were reviewed and considered for the study to explain physician prescribing behaviour. The selection on these theories was to give logic to the prescribing behaviour of physicians by explaining the factors affecting this. In addition, these theories helped with identification of relationships that needed further research. These were the theory of planned behaviour, the expectancy value model and drug choice model. Each of the selected theories were reviewed and their appropriateness to the study discussed.

2.2.1 Theory of planned behaviour

The planned behavior theory is an extension of the theory of reasoned action. The theory of reasoned action looks at behavior and predicts behavioral intention, by separating intention from behavior (Hill et al., 1977; Icek Ajzen; Martin Fishbein, 1980). It also discusses the factors which limit behavior as attitude and our norms which predict behavioral intent. This would be where our attitudes make us do one thing, but the norms suggest we should do something different.

This planned behavior theory was formulated by Ajzen et al, 1991 to address the shortcomings in the theory of reasoned action in dealing with behaviors over which people do not have complete volitional control (Ajzen, 1991). It links the physician as an intermediary in a clinical setting (Godin et al., 2008a). It has been used successfully by various authors, to understand the underlying factors that influence physician prescribing behavior(Godin et al., 2008b; Perkins et al., 2007; Ponnet et al., 2014).

The theory identifies intention as a major factor in prediction of behavior. It states that one can predict the Intentions to perform different kinds of behaviors of physicians with high accuracy (Ajzen, 1991). This occurs from the attitudes (one's opinion towards behavior), social factors named subjective norms (opinion of others about behavior), and perceived behavioral control (self-efficacy towards behavior based on previous experiences). In addition, these intentions and related perceptions of behavioral control account for variations in actual behavior. They are related to appropriate sets of conspicuous behavioral, normative, and control beliefs about the behavior (Ajzen, 1991). In the case of physicians' prescribing behavior, this would be such as their intention to prescribe generic medication as opposed to branded medication as influenced by their opinion towards the medication as well as the that of their peers.

The second element in this context is influence of subjective norms such as expectation to perform by a particular group (Conner et al., 2002a). This may manifest by social influence from the payer to contain the healthcare costs, the hospital to maximize on revenue generated at minimum cost as well as demand for certain drugs by patients and their expectation to be given high quality medication. In addition, this may also manifest through the hospitals' expectation of physicians to prescribe medication based on a pre-determined formulary or standard treatment guidelines.

The third element considers perceived behavioral control. This is a function of conduct, as it shows previous experiences with the product while expecting future problems. It illustrates a physician's perception of the depth to which performance of the behavior is doable. It's attributed to the existence of variables which may affect the change of the behavior. These may be contextual factors, such as medication characteristics, cost benefit ratio, persistence of habits by physicians and patient needs(Conner et al., 2002b). Thus, this review shall seek to extend the model of theory of planned behavior by including variables: products, physician, patients, payers, environmental and pharmaceutical related factors and investigating their influence on the prescribing decisions.

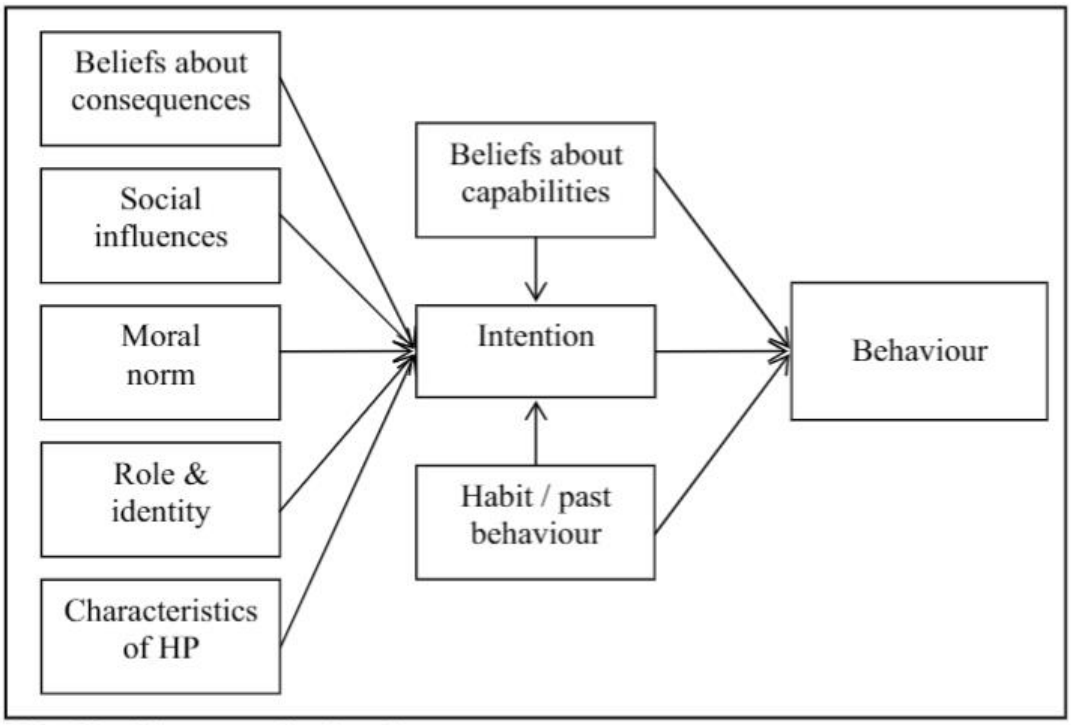
The theory assumes that consumers decide by calculating the costs and benefits of different plans of action then choose the option that maximizes their expected benefit

(Sutton, 2014). Also, it's a rational choice model assuming that a person's interest is the best structure for understanding their behavior; rational behavior of a person is the result of sequences of cognitive deliberation. In addition, inherent factors such as one's attitude play an important role. The other assumption is that the best behavior prediction is given by asking how people intend to behave. However, intention can't express itself in behavior if it's not possible to perform it due to existing barriers.

These assumptions have been challenged, that a person's behavior is complex and is made up of social, moral and altruistic behavior and personal interest. Behavior is entwined in social and collective decision-making contexts as well as other contextual factors that shape one's preference. Also, routines and habits bypass cognitive deliberation and undermine a major assumption of the model. Finally, emotional responses appear to invalidate cognitive deliberation (Sutton, 2014). While this theory is logical, the reality is that all factors may not be stable. In addition, previous behavior will have an effect on later behavior which is independent of attitudes, subjective norms, beliefs and intentions (Linton, 1998; Waarts et al., 2002). This therefore calls for looking at the factors which affect the variables longitudinally.

Under this theoretical model, the irrational prescribing phenomena of physicians in developing countries was investigated. It hypothesized the influence of physician opinion towards their prescribing decisions. In the context of this study, the physician's opinion towards generic medication was to determine if there was favorable or unfavorable attitude towards it. In addition, their opinion towards the cost of treatment incurred by the patients will influence their prescribing. We measured this opinion as the degree to which physicians would approve the brand of the medication. The aim of this was to better understand how these factors affected physicians' prescribing behavior. Below is an illustration of the relationship of these variables in the prediction of intention and behavior.

Figure 2. 1: Hypothesized theoretical framework for the study of health-care professionals' behavior and intention.



HP : Healthcare professional

Therefore, the proposed theoretical underpinning provided a sturdy framework that can undergo empirical testing. This is based on my previous clinical experience where I note that the behavior of clinicians was affected by the opinion of the peers and previous experiences. Other theories that would have been selected are the expectancy value model and the drug choice model.

2.2.2 Expectancy value model

This theory is an adaptation by Retting to the social learning theory. It stipulates that one's behavior is shaped by his environment. In addition, there is subjective probability that each behavior will result in a particular outcome (Rotters, 1996). According to this theory, a physician's choice of medication is affected by the magnitude of the expected benefit and adverse effects. This paradigm structures and denotes the evaluation of risk to benefit in drug selection (Rotters, 1996). This theory would be most applicable in a study where physician's choice of high-quality generic medication is perceived to be beneficial to patients by improving disease outcome and lowering the overall cost of

treatment. This is not necessarily true of generic medication. Also, it would be key in an instance where we needed to review the risks and benefits of the contextual factors.

2.2.3 The drug-choice model

This is a cognitive prescribing model that is related to Vroom's expectancy theory (Vroom, 1964). The theory recognizes two types of beliefs: expectancy and instrumentality. Expectancy is the belief that there is subjective probability that one's efforts will be followed by success. In this research, this may be linking physician perceptions that use of lower priced generic medication would reduce healthcare costs and improve quality of life.

On the other hand, instrumentality is a subjective belief on the correlation between initial outcome and a consequent outcome. That good performance would result in a valued outcome. In this study, the initial outcome would be choice of generic medication and the consequent outcome being physicians personal feeling of making a difference in the society by improving the healthcare outcomes.

The drug choice model proposes that a physician's choice of drug is related to knowledge, beliefs, and assumptions about the expected outcomes and the attached values. These outcomes are related to disease control, patient's compliance, expected adverse effects, cost, patients expectations and peer criticism (Segal & Hepler, 1982). This would be the beliefs by physicians that use of low cost, high quality generic medication would manage diseases in a cost-effective manner while ensuring sustainability.

This theory was not chosen based on knowledge that use of generic medication would not necessarily improve outcomes as this would be a consequence of other factors.

In conclusion, the planned behavior theory was central to this study as it highlighted the factors influencing prescribing behaviors of physicians. The theory is associated with the study as it emphasized aspects such as intention, attitude, opinions of others as well as previous experiences towards prescribing decision making. The theory therefore hypothesized patient, physician, environmental, pharmaceutical, payer and product related factors on prescribing behavior of physicians.

2.3 Empirical review

This section reviews previous studies on the effect of product, physician, patients, payers, environmental and pharmaceutical related factors on the prescribing behavior of physicians**.**

2.3 1 Effect of Product Related Factors on Prescribing Behaviour

Product-related factors such as cost, efficacy, side effects as well as the perception in the market have a role to play in physician choice of medication. Cameroon et al, (2012) conducted a cost minimization analysis survey to find out what savings could be gotten from an originator to branded drug switch (Cameron et al., 2012). This was done from 2004 - 2008 and included private and public health care facilities in 17 LMICs. The findings showed that more than 50% of savings would be generated in all but 2 of the countries and the rate of switching varies from 9% to 89%. This resulted in cost savings ranging from 50% to 70%. This variation may be due to market factors and national policies. The conclusion was that generic medication saves on cost therefore it is needed for physicians to consider them when making decisions on choice of medication.

One limitation of this study is that the countries included had data on pricing from the World Health Organization/ Health Action International (WHO/HAI) surveys and volume data from Intercontinental Medical Statistics (IMS) Health. They did not consider the depth of generic penetration. Second, the results of the analysis are dependent on the choice of medication used and may not reflect those of the highest national consumption. In addition, current volume data and price data were needed for each medication to enable estimation of savings in cost. The above limitations would therefore hinder the generalizability of the results. The authors acknowledge that generic medication would result in cost savings but does not tell us the extent to which it affects prescribing.

Similarly, a systematic literature search was conducted by Toverud et al 2015, to explore the knowledge of pharmacists and physicians on cost benefits of using generic medication (Toverud et al., 2015). The study analyzed 24 out of 1322 articles published from 2002 to 2012, on experiences of physicians and pharmacists with generic drugs and their substitution. The findings indicated that there was awareness of the cost-effectiveness of generic medication and their effect in improving access. This was identified as a factor that they considered before prescribing medication. However, in developing countries

differences were observed in control routines, bioequivalence requirements, and manufacturers. In addition, there were concerns about efficacy and quality mainly due to lack of information and trust. On the contrary, participants in developed countries trusted the quality of generic medication and would offer them without considering the socioeconomic status. This may be attributed to more reliable public control mechanisms and enhanced bioequivalence expectations. One limitation of this review is inclusion of articles only published in English as well as the sample size which may influence external validity. In addition, of all studies that were reviewed, a small proportion was from developing countries thus need to look at cost from the perspective of physicians practicing in developing countries.

In addition, Hart et al, 1997 conducted a simulation protocol for treatment of two patients, with urinary tract infection at Petah-Tiqva District in Israel(HART et al., 1997). Its objective was to study the effect of the pharmaceuticals cost on physicians' prescribing decisions. The study population were 30 outpatient-based family physicians and 30 internal medicine ward physicians of a Community Hospital. They prescribed medication in two phases, first phase when the cost of the drug was not known, and second phase, two months later when the cost of the drugs was known. The findings indicated that information of the cost of medication influences the prescribing of generic medication among ward physicians, while family physicians preferred less costly drugs even before they were told about the costs. The study was, however, limited to a small sample size, which makes the findings ungeneralizable. In addition, the study tested medication for an acute illness and the findings may be different for chronic medication thus need to review the effect of cost on prescribing decisions of chronic medication.

Another quantitative study by Ryan et al, 1996 was conducted in Grampian region of Scotland to understand the influence of costs on general practitioners' prescribing for penicillin, analgesics and treatment of ulcers (Ryan et al., 1996). Of the 273 general practitioners who were contacted, only 176 responded. The results showed that most general practitioners acknowledged that they had inaccurate knowledge on the cost of medication but should consider this when prescribing. The study lacked generalizability of the findings as it was conducted in a developed nation and only sampled medication

for treatment of acute conditions. It is therefore necessary to review the effect of cost when managing chronic conditions in developing countries.

Mohanty et al, 2010 carried out a cross sectional study in the General Medicine Outpatient Department at GSL Medical College Hospital, a tertiary care hospital Rajahmundry, India. The study aimed at finding the prescribing behavior of physicians by analyzing past prescriptions. An analysis of 608 prescriptions was done, each having an average of 3 drugs amounting to 1826 drugs. Only 26 (1.42%), were generic and this was attributed to concerns about the efficacy and bioavailability of these formulations (Mohanty et al., 2010). In addition, there was an effect of the ignorance of prescribers on variations in price between generic and branded drugs as well as lack of information on the availability of the later. However, this study included all prescribers without categorizing them into the existing structure, Junior or Senior residents, lecturers, Associate professors, and Professors. Also, it represented a limited population of patients and had a short study period. These limitations would therefore limit the generalization of the study findings. Also, the variation in specialists in this facility because it was a teaching facility may limit the transferability of the findings to Nairobi County that has few teaching facilities therefore having a different kind of categorization of prescribers.

Colgan et al, 2015 carried out a systematic review of observational studies to examine the attitudes of lay people, doctors, and pharmacists towards generic drugs. Quantitative analysis of data from prospective studies and cross-sectional published(Medline, Embase, PsycINFO, Scopus) in English after 1980 was done (Colgan et al., 2015). Of the 2737 articles, only 52 were analyzed, the majority showing that lay people, doctors, and pharmacists had negative opinions towards generic medication due to their ineffectiveness, poor quality and side effects. The study revealed that more than ¼ of the lay people and doctors viewed generic medication as ineffective and of inferior quality. Moreover, an equal number of pharmacists and doctors believed that generic medication caused more side effects. Finally, a larger number of lay people did not like generic substitution. The limitation of this study is only including quantitative studies that have been published in four databases in English without hand searching.

2.3.2 Effect of Physician Related Factors on Prescribing Behaviour

The prescriber, who is the physician is the final decision maker as to which drugs are given to the patients. It's therefore important to understand their views on generic medication.

Dunne et al, 2015 carried out a systematic literature review of peer-reviewed, published literature to understand the perspectives of stakeholders among them physicians, pharmacists and patients on generic medication (Dunne & Dunne, 2015). They reviewed 16 of 286 papers published from January 2003 to November 2014 in Scopus and PubMed. The findings revealed improved opinions on generic medication among all groups. Most physicians accepted to use generic medication as they had confidence in them and had lower cost. Of the studies captured in this review, none included perspectives from Kenya therefore creating concerns in generalization of the findings. It is therefore important to understand if physicians working in Kenya would prescribe generic medication based on their affordability. The study also included publications that had recruitment bias such as pharmaceutical industry derived databases where physicians were paid to participate in the studies. This introduces a bias thus questioning the credibility of the findings.

Patel et al, 2015 carried out a qualitative study to describe the experiences of physicians with patients' financial burden when managing chronic diseases(Patel et al., 2015). They conducted 4 focus group discussions at an academic medical Centre in November 2013. The study included 29 family and internal medicine resident physicians in the US, selected through convenience sampling. They administered semi-structured interview protocols using trained facilitators. The study revealed that physicians are visible to the financial burden of patients on chronic care. In addition, some patients may perceive their financial burden to be imperfect. It is therefore important to discuss the issues related to financial burden with patients and come up with individualized strategies to address the challenges. However, they acknowledged that they felt uncomfortable considering the cost before prescribing medication. They also acknowledged that the most common strategy to address the financial burden is the use of generic drugs. This study was able to identify existing gaps in patient-focused care and opportunities for interventions on behavior. Therefore, the use of generic medication has been identified as a strategy to consider bridging this gap irrespective of ability to pay. By including resident physicians

from an academic setting, the authors made the findings ungeneralizable in all other practice settings and geographies.

Dunne, et al 2014 carried out a qualitative study to assess the perceptions of general practitioners in Ireland on generic medication after enactment of the 2013 legislation for generic substitution and reference pricing (Dunne et al., 2014). One on one semi structured interviews of 34 general practitioners from urban and rural areas were done. The results indicated that general practitioners believed that generic medication was effective. Most of them stated that they frequently prescribed generic drugs mainly due to their affordability. In addition, the majority reported patient complaints about related side effects attributed to poor quality of medication. However, these findings may not be generalized since the participants who were included in the study had a university affiliation and their mindsets may be different from those who do not have any link with any academic institution. It would therefore be important to find out if these perspectives would be shared by general practitioners in a nonacademic set up.

Hassali et al 2014, carried out a systematic review to gauge the knowledge, attitudes and perceptions of physicians towards generic medicine in LMICs (Hassali et al., 2014). 9 electronic databases were searched in peer reviewed journals published between January 2001 and February 2013. 16 out of 10,588 articles were included, 5 of which were from LMICs. The study showed that physicians from LMICs had mixed views on generic medication while those from high income countries had positive observations. Few similarities in the income groups were identified among them cost as a factor promoting use of generic prescriptions. The study employed a small sample size especially from LMICs thus inability to generalize the findings.

Kasliwal (2013), conducted a quantitative study to determine the impact of psychosocial factors on varied age groups and area of specialization of doctors on prescribing patterns. The study was done in Rajasthan, India between December 2011 and April 2012 (Kasliwal, 2013). Only 431 of the 750 doctors from General Medicine, Gynecology, Pediatrics, Ophthalmology and Psychiatry participated from 26 different towns. The results of the study showed the varying impact of psychosocial factors across different demographic characteristics, with young doctors being influenced more. Pediatricians rated psychosocial factors of least importance in influencing their prescribing. The

authors included only five specialties as well as concentrating on doctors practicing in urban areas therefore limiting generalizability of the findings. The gap noted here is lack of inclusion of general practitioners who attend to majority of patients receiving primary care in Kenya.

Studies have shown that physician prescribing behavior may be affected by the behavior of specialists in active research, or key opinion leaders. Nair et al 2006, conducted a review of primary and secondary data to identify the doctors whose actions affect the designated physician's approach to the management of chronic diseases in the US. Primary data was generated from a survey of 1,500 out of 56,000 prescribers between January and February 2004. Only 182 prescribers and 182 out of 290 key opinion leaders were part of the study (Nair et al., 2006). This study revealed that the behavior of key opinion leaders remarkably affects physician behavior and not vice versa. More than 91% of physicians attested to being influenced by only one key opinion leader, with at least 38% key opinion leaders identified. Of the key opinion leaders, 97.4% are specialists and more than 90% are associated with hospitals, 30% being university hospitals. This influence is done through various ways; 94.5% through direct contact, 78% through symposia & conferences and 67% within the clinical setting (Nair et al., 2006). The study used a non-robust network that was not within the control of the researchers. Moreover, the authors only revealed the effect on those treated thus the social multiplier effect cannot be computed for all types of physicians. Also, the data does not enable us to accommodate unobserved heterogeneity in peer effects. The above limitations would therefore affect the robustness of the data and generalizability of the findings.

2.3.3 Patients Factors and Effects of Prescribing Habits

To maximize generic drug use among patients, it is important that the public have positive opinion and that their knowledge requirements are met. Therefore, it is necessary that we improve their knowledge and confidence in generic medication. A cross sectional questionnaire survey of 122 patients was done for a year from March 2015 at 2 pharmacists in Chiba, Japan. It aimed at identifying the differences in the characteristics among statin users, their views on generic medication and factors affecting their use (Kobayashi et al., 2019). The study findings revealed that some patients had concerns about switching from their existing regimen to generic medication. In addition,

demographic characteristics such as age, gender and rate of copayment had no effect on the switch, but they preferred a physician led process. The small sample size and choice of the study site is a significant limitation of the study as the findings cannot be generalized. Also, this study did not illustrate the relationship between the concerns of the patients on the switch and the effect on physician decision making.

Further , a retrospective study was done near Tokyo at Chiba University Hospital to find out if the patients' frequency and reasons for switch of branded to generic drugs differed according to the dosage form and the therapeutic category (Hamada et al., 2020). This study was conducted over 3 years from July 2014 and 121 prescriptions of generic drugs analyzed. The results showed that 30% of the patients requested a switch of medication due to the safety, efficacy, comfort of the drug and the patients desire being the commonest reason. In addition, there was a relationship between the switch and therapeutic categories as well as dosage forms. This study has 3 drawbacks, first, the pharmacists may not have inquired about the requested drugs if they were handwritten by the physicians. Secondly, there were varied brands of generic medication across the pharmacies thus it was hard to determine if the associated problems were due to adopted brands. Finally, it was not possible to determine the duration of use of original drugs by the patients as this may affect the patient's decision. This study was also done in Tokyo, a developed country, its findings may therefore not be replicable in a developing country thus need to get the view of physicians in this setting.

Kobayashi et al, 2011 did a quantitative study aimed at assessing the understanding and the patients attitude towards substitution of generic medication and evaluate the factors associated with the experience and willingness of generic substitution (Kobayashi et al., 2011). The results showed that 68.4% of the respondents knew the interpretation of generic medication, 86% of them knew that generic medication was affordable and 71.1% knew that the active ingredients were similar to branded medication. However, there was limited understanding in other aspects such as the availability and accessibility of generic drugs. Furthermore, patients that had previous experiences with generic medication were more willing for substitution with the majority citing that physician played a major role in their decision making.

Kjoenniksen et al, 2006 conducted a retrospective review of 13,823 prescriptions for 2128 different patients dispensed in September 2003 at Stoke Pharmacy, Norway to assess the attitudes and experiences of patients after three years of generic substitution (Kjoenniksen et al., 2006). The study included 386 patients from 18 to 85 years, receiving three to seven different drugs and managed their own medication. 281 respondents participated and had an average age of 66years. The findings showed that the patients who were more likely to switch medication were informed by their physician. In addition, 41% of patients reported that personal economic incentives played a role in their decision making. Further, at least half of the participants had switched their medication, 36% of them had a negative experience and these were unrelated to age, gender, number of medication and information of the generic medication. The major shortcoming of this study was that it included a restricted number of patients thus the findings may not be generalizable.

A survey designed as a randomized controlled trial of 804 patients in 31 general practices was done by Niebling et al, 2005 to examine the attitude of patients towards generic drugs. The study focused on their level of satisfaction with the information provided by general practitioners in Germany (Niebling et al., 2005). The intervention was informing general practitioners about their generic potential. The second intervention was giving an information booklet with tips with the aim of driving behavior change. The study showed that two thirds of patients would differentiate branded and generic medication. A third expressed dissatisfaction with the information provided while 37% were skeptical due to the low cost. This is because they felt that these drugs were manufactured to solve the financial challenges in the health insurance system in Germany to their disadvantage. The major limitation of this study is that it had sampling bias as it underrepresented doctors with low interest in pharmacotherapy and those with low rates of generic prescribing. In addition, patients who were engaged were those with an interest in health topics and were easier to handle.

The above studies show the physicians role in patient's choice of medication both through the provision of education and actively prescribing the generic medication. However, they do not give the relative effect of this on the prescribing decisions.

2.3.4 Effect of Payer Related Factors on Prescribing Decisions

There is some evidence to imply that the patient's payments methods affect physicians prescribing decisions.

Devari et al, 2018 conducted a literature review of electronic databases such as PubMed/ Medline Central, Scopus, Cochrane Libraries and Google scholar (Davari et al., 2018). Studies on factors that influence physician prescribing decisions that were published between the year 2000 and 2016 were reviewed. 33 of the 1122 papers were analyzed and factors identified namely, the patient's clinical condition, effect of pharmaceutical companies, cost of medication, personal attributes of physicians, and patients. Also, the study showed that the level of reimbursement of pharmaceuticals and mode of payment by the patients also affects the prescribing decisions. Notable was higher expenditure among insurance clients and as result some insurance providers introduced capitation to control it (Chaix-Couturier et al., 2000). Furthermore, financial incentives to the prescriber such as lower copayments for patients who chose generic drugs do play a role to the choice of drugs (Huskamp et al., 2003). The limitation of this review is that it only included articles that were published in English language thus may introduce bias. Also, there was variation of the studies included in the study design, data collection and analysis technique and few classes of medicines. In addition, few studies were included thus making external validity questionable.

Similarly, Reichert et al, 2000 conducted a written self-administered survey of internal medicine physicians at the New York University Medical Center, Mount Sinai Campus in February 1998 (Reichert et al., 2000). This study was done to measure their attitudes and knowledge of the medication. They assessed the extent to which physicians consider cost and a patient's medical insurance benefits in their prescribing. In addition, the study sought to measure physicians' information on actual costs of medication. There was a 71% response rate, 88% of whom felt that it was important to consider the cost of medication when prescribing. In addition, 71% of them were willing to compromise some degree of efficacy to ensure affordability. However, 80% were unaware of the actual costs of medication as only 33% had access to the data. 13% of the physicians had been formally educated on the same. Also, 94% of physicians strongly considered the cost in patients paying out of pocket, 68% when with Medicare, and 30% with Medicaid or were

in a health maintenance organization. These findings confirmed the results of earlier studies that the cost of medication was important in physician decision making. However, there were challenges with the methodology in measuring physician knowledge of cost of medication which may question reliability of the findings. Also, the participants were physicians in the internal medicine department affiliated with a single academic medical center posing a challenge with generalization of the findings.

Rafferty et al, 1997 analyzed data from prescriptions at the Drug Utilization Research Unit's database for all practices within Northern Ireland between April 1989 and March 1996. The analysis aimed at comparing the patterns of prescribing before and after April 1993 when fundholding was introduced (Rafferty et al., 1997). The study included 3 first wave, 34 second wave, 9 third wave and 268 non fund holders. The findings of the study revealed that the cost and frequency of prescribing increased across all groups but at a lower rate than among the fund holders. In addition, the rise in cost per item was in tandem with a rise in generic drug use. However, the annual cost escalation in the third year was similar for first wave and non-fund holders. The main study limitation is calculation of the first-year fundholding savings per group by presuming that they had similar percentage growth in costs in that period. These crude estimates don't allow for escalation in the cost of drugs and therefore may be underestimated, questioning the validity.

Roberts et al, 1997 performed a retrospective study of prescribing data of 18 drugs prescribed by the brand name and for 14 drugs with cheaper alternatives or of inferior clinical value. The data reviewed was for prescriptions from April 1992 to March 1993 and April 1993 to March 1994 when the incentive scheme was implemented. The study setting was 499 general practices in the former Northern Regional Health Authority, UK (Roberts et al., 1997). The study's aim was to assess the impact of an incentive scheme on general practitioners' prescribing behavior by promoting therapeutically equivalent lower cost prescribing. The study results revealed that 17 of the 18 branded drugs had lower rates of prescribing between 1993 and 1994. Further, the overall costs and the prescribing rates for each general practitioner were similar in all practice groups in 1992-1993 and differed in 1993-1994. The low cost-growth band of practices performed significantly better. This suggests that they have taken heed of the potential cost-savings. Notable was that it was easier implementing generic drug use as a cost saving measure.

This study presents a contextual gap as its setting is a developed country and thus its findings may not be transferable to a LMIC.

2.3.5 Effect of Environmental Factors on Prescribing Decisions

Abdulameer et al, 2012 conducted a cross-sectional study in the cardiac out-patient clinic of Penang General Hospital, Malaysia for four months in the year 2008. The study aim was to determine the trend of prescribing, adherence to the guidelines, and impact of drug expenditures on utilization of drugs (Abdulameer et al., 2012). The study included 313 of the 500 patients with hypertension. The results showed that there was good adherence (85%) to guidelines and only slightly reduced in comorbidities. Where there was non-adherence to the formulary guidelines which recommended first line treatment with having affordable drugs such as diuretics, it was noted that there was increased cost. Use of thiazide diuretics such as perindopril was recommended as it is well tolerated and affordable. The major limitation of this study was the small sample size therefore not giving a precise picture of the management of hypertensive patients.

Further, Moon et al, 2014 conducted a retrospective analysis of strategies used to increase prescribing of the generic Losartan antihypertensive (Moon et al., 2014). European countries have policies that promote generic prescribing such as prescribing targets, financial incentives for patients and physicians, high voluntary INN prescribing as well as mandatory generic substitution (Bennie et al., 2014; Godman et al., 2014). The results showed that the use of losartan was more than 90% of all angiotensin receptor blockers in Denmark. In addition, Sweden had enhanced uptake of losartan. However, the utilization reduced in some countries with no attribution to specific demand side measures. However, the study's setting makes the findings untransferable to LMICs.

Saravdekar, et al 2019 conducted an observational, and retrospective study to review the implementation of the principles of Pharmaco-economics and Pharmacovigilance in the procurement, selection, and use of essential medication. In addition, there was need to develop reforms as per the Quality Procurement Management Policies(QPMP) implemented in the Hospital Formulary Committee at Sir Sundar Lal Hospital, at Varanasi (Saravdekar et al., 2019). This study showed that the implementation of the QPMP can help countries effectively deal with cost and quality. This may be done

through availing quality assured medication at affordable prices while further improving the confidence of physicians.

A similar study to the above was done by Yilam et al. (2020) in Ethiopia at Mekelle General Hospital (MGH) between 01 January and 31 December 2016. The study used the descriptive cross-sectional, retrospective hospital-based study. It aimed at assessing the prescribing pattern, using WHO prescribing indicators as per the WHO and International Network for Rational Use of Drugs (INRUD) guidelines. Of the 10,000 prescriptions made for a year from January 2016, only 384 were analyzed (Yilma & Liben, 2020). It was noted that 751 drugs were prescribed out which 90.4% were by their generic name, this is lower than the WHO recommendation of 100% (Isah et al., 2001). In addition, 58.6% of the prescriptions had antibiotics, 42.2% had injectable medication, and 86.3% encountered from the hospital formulary. The major limitation of this study is the small sample size therefore affecting the generalizability of the findings.

2.3.6 Effect of Pharmaceutical Related Factors on Prescribing Decisions

The physician and pharmaceutical companies' relationship has created a debate for years with concerns being raised about the effect of their interactions on the prescribing behavior.

A systematic review of articles published in electronic databases namely Embase, PubMed, Google scholar and Cochrane Library between 1992 and August 2016 was done. The aim was to explore the impact of interactions between the pharmaceutical industry and physicians on prescribing habits. Of the 2170 records, only 49 cross-sectional, survey designs, cohort and randomized trials studies were included (Fickweiler et al., 2017). The study results showed that these interactions influenced physician's attitudes, prescribing and the drug formulary. These were through dinners, Continuous medical education (CMEs)/symposia, honoraria, funding for research, scientific journals, travel for conferences, free drug samples, promotional material, and free lunches. The main gap of this study was inclusion of studies that had no evidence for the significance of their results or had differing study designs and outcomes affecting possible meta-analysis. In addition, the studies that were included had no validity of outcome measurements and had poor handling of confounders therefore subject to bias.

Lofti et al, 2016 performed a systematic review of Medline and Embase electronic data bases to review both quantitative and qualitative studies in September 2015 (Lotfi et al., 2016). The aim was to understand the physician's knowledge, attitudes and beliefs regarding their interactions with pharmaceutical companies. These interactions ranged from lunches, gifts, meetings, free drug samples, travel funding, consultancies, stock ownership, pharmaceutical-sponsored research, and continuous medical education. Of the 11,189 studies captured by the search strategy, 9 reports from 9 eligible studies were included. The results of 4 studies showed that the highest perceived benefit of the interaction was information and rewards. Also 5 studies assessing perception believe that the impact of the interaction on physician behaviors was minimal. In addition, the pharmaceutical sponsored CMEs, conferences were seen to have higher impact. The research gap in this review was inclusion of studies only published in English. In addition, other limitations are that none of the existing primary studies assess knowledge, they used non-validated questionnaires and had varied sociocultural backgrounds therefore affecting validity and generalizability of the findings.

Lieb et al, 2014 performed a quantitative study to determine the extent of influence of the prescribing habits of Bavarian Association of Statutory Health Insurance Physicians through contacts with pharmaceutical sales representatives from 24th June 2011 to 30th October 2011. From a pool of 20,000 physicians, only 1,388 physicians were part of the study. The response rate was 11.5%, of these 131 were GPs or internal medicine specialists, 3 cardiologists and 26 psychiatrists or neurologists (Lieb & Scheurich, 2014). The study results showed that 84% of the doctors interacted with sales representatives weekly and 14% daily. In addition, 69% accepted free drug samples, 39% stationery and 37% CMEs. However, 3% of physicians did not accept any benefits. 43% of physicians believed that the information they received from sales representatives was adequate and accurate and 42% believed that these interactions affected their prescribing habits, and this was reflected by the fact that the practices which had more interactions with sales representatives having higher total prescriptions of generic medication. Low response rates and choice of physicians in this study do not allow general statements to be made that cut across all physicians. This limits the representativeness of the findings. Also,

there is no objective data on the frequency of contacts, the acceptance of gifts exists, types of sponsored CMEs hence these subjective data may be an underestimate.

Oshikoya et al. (2011) conducted a quantitative study of doctors at the University College Hospital, Ibadan in Nigeria. The study aim was to determine the sources of drug information and assess the self-reported impact on their prescribing behavior. Only 40.8% of the 400 doctors working at this hospital participated in the study. The results showed that there was high utilization from each source: 98.8% from drug information, 96.9% from reference books, 93.2% from sales representatives, 92.6% from promotion materials, 91.4% from scientific papers/journals/internet and 88.3% from drug promotions (Oshikoya et al., 2011). Over half of the respondents, reported that sales representatives were an accurate and reliable source of information, therefore influencing their prescribing behaviors. The major study limitation here is the self-report study which may be an underestimation of the effect of pharmaceutical promotion on the prescribing behavior of doctors.

Contrary, a cross-sectional observational study of Slovenian family physicians and survey was carried out in October 2011 (Klemenc-Ketis & Kersnik, 2013). The study's aim was to determine if there was an association between pharmaceutical sales representatives and the prescribing index of family physicians. There was a 27.6% response rate and of this 23.1% had a prescribing index of >100%. The conclusion therefore is that the prescribing index of family physicians was not significantly affected by interactions with sales representatives (Klemenc-Ketis & Kersnik, 2013). Some limitations of this study were the low response rate and the self-reporting of the prescribing index by family physicians may lead to selection bias. Further the study did not include the demographic characteristics of the population nor was it specific in the details of the drugs that were prescribed or rated highly and their effect on the frequency of prescriptions.

2.4 Conceptual Framework

This model demonstrates the relationship between factors affecting prescribing (patient, payer, product, environmental, physician and pharmaceutical factors) and prescription behavior of antihypertensive drugs by Physicians in active clinical practice in Nairobi County. The following conceptual framework has been formulated based on the literature review and the hypotheses formulated as shown below:

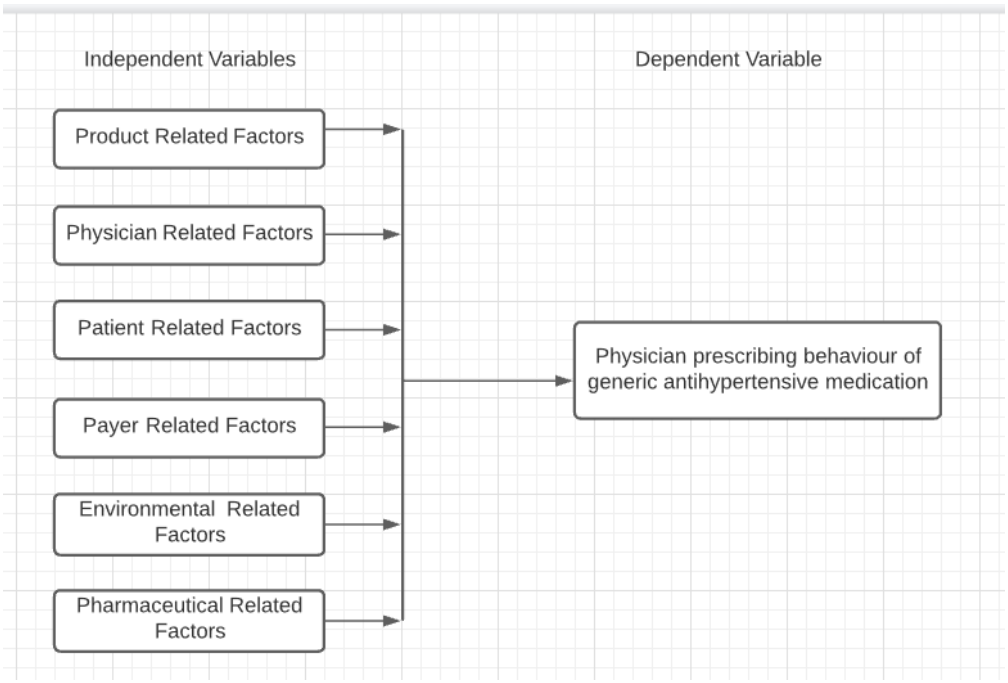


Figure 2.4: Conceptual Framework

2.5 Operationalization of the Variables

Operationalization is the concept of making variables simpler to make it easy for interested parties in the study to understand. It enables the measurement of the research variables to respond to the research questions.

Likert scale of 1 – 5 was used to measure the research variables as the study sought to gather primary data.

Table 2.5: Operationalization of Variables

Variable	**Indicator**	**Rating Scale Measure**
Product factors	Reputation/brand Efficacy Safety Memorability Awareness Quality	Scaling point 1-strongly disagree 2-disagree 3-not sure 4-agree

	Cost benefit ratio	5-strongly agree
Physician factors	Knowledge Level of education Expectations Memorability Facility of practice	Scaling point 1-strongly disagree 2-disagree 3-not sure 4-agree 5-strongly agree
Patient factors	Age Gender Underlying conditions Ability to pay. Awareness Preference Feedback on their experience Attitudes	Scaling point 1-strongly disagree 2-disagree 3-not sure 4-agree 5-strongly agree
Payer factors	Mode of payment Benefit designs Incentives	Scaling point 1-strongly disagree 2-disagree 3-not sure 4-agree 5-strongly agree
Environmental Related Factors	Access to medicine Effect of standard treatment guidelines Effect of formulary guidelines Communication with a pharmacist Expertise of the advising pharmacist	Scaling point 1-strongly disagree 2-disagree 3-not sure 4-agree 5-strongly agree

Pharmaceutical factors	Reputation of manufacturer Effect of free medical samples Level of association Available information Incentives	Scaling point 1-strongly disagree 2-disagree 3-not sure 4-agree 5-strongly agree
Physicians prescribing behavior	Individual issues Cost of drugs Promotion of drugs Drug issues Environmental issues Prescriber issues	Scaling point 1-strongly disagree 2-disagree 3-not sure 4-agree 5-strongly agree

2.6 Gap Analysis

Recent publications address the factors influencing physician prescribing decisions in general without giving the relative effect of each of them. It is therefore important to understand the relative influence of products, physicians, patients, payers, environmental and pharmaceutical related factors towards physicians' prescribing behavior in developing countries. This shall help with policy development on which factors to focus on to promote uptake of generic medication.

This study therefore sought to determine the extent to which physician, product, patients, payers, environmental and pharmaceutical related factors affect physicians prescribing behavior.

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Introduction

The methodology outlines the plan, structure, strategy, and investigations used to gather information to fulfil the research objectives. It gives an outline of the research design, the targeted population, data collection method, quality of research, diagnostic tests, analysis of data and its presentation as well as the ethical considerations.

3.2 Research Design

The research design defines the methods and techniques that the researcher shall follow in gathering, measurement and analysis of the data (Sekaran, 2003). The study used a correlational design which measures two variables and assesses the statistical relationship (correlation). Here we did not manipulate the variables. This was descriptive research which aimed at identifying variables that have a relationship to the extent that a change in one creates some change in the other. In addition, correlation was preferred as the statistical relationship of interest is thought to be causal, we cannot manipulate the independent variables (Apuke, 2017).

3.3 Target Population

The population is defined as the number of elements, persons or objects with similar traits that are under consideration for the study (Wahyuni, 2012). The target population for this study was selected from all physicians working in Kenya. This is because their daily interactions with patients support their understanding of the rate of prescribing of antihypertensives. The inclusion criteria for the sample population were those in active clinical practice and working within Nairobi County. Only those who had been in the hospitals and outpatient clinics for three months participated in the study as they had information on the level of prescriptions of hypertension. According to the 2015 Kenya health workforce report, Nairobi has the highest number of doctors at 32% of the registered medical physicians (MoH, 2016). According to the KMPDC 2022 register, there are 11830 registered physicians (KMPDC, 2022).

3.4 Sampling Technique

The participants were selected through non-probability sampling method from all physicians, both medical interns, general practitioners and specialist consultants in active clinical practice. In this type of sampling technique, the elements chance of being chosen for membership in the sample is known (Sheppard et al., 2020). This is because we aimed to identify a representative sample from which data was collected. The representative sample was to resemble the population from which it was drawn to ensure generalizability of findings. This entailed including all physicians working in Nairobi County who met the inclusion criteria. They were expected to have expert knowledge by virtue of having treated patients with hypertension and thus were able to provide good information to the researcher (Sekaran, 2003).

3.4.1 Sample Size

The sampling unit was the prescribing physician. The sampling size was 57% of all physicians in Nairobi County. There are no local studies of the proportion of physicians that practice generic prescribing. Therefore, the study used findings of a cross-sectional survey of prescribing primary care physicians in Patan city of Gujarat. The study established that 57% of the physicians did generic prescribing(Charan et al., 2021). The estimated proportion of outcome of interest was 57% of this population. Based on this figure, the sample size was calculated as below:

N: Estimated Sample size

P: Estimated proportion of outcome of interest (57%)

S: Standard error set at 5%

Z: Z score value corresponding to 95% confidence interval (1.96)

$N= [Z^2 P(1-P)]/S^2$

$N= [(1.96^2) * 0.57(1-0.57)]/0.05^2$

N=368

According to the above formula the minimum sample size was 368 physicians.

3.4.2 Sampling Frame

All physicians in active clinical practice in Nairobi County between 1st May 2022 and 30th July 2022 who met the inclusion criteria were considered for sampling. According to the Kenya Medical and Dentists Council (KMPDC) 2022 register, 11830 physicians were practicing in Kenya. However, only 32% (3785) of these are in Nairobi County. We used the multistage cluster sampling technique. This involved dividing the population into groups (clusters), specialist consultants, general practitioners, and medical interns.

The study included everyone within the three clusters.

3.5 Data Collection Technique

Data collection methods are defined as the ways that the study used to gather data required for the analysis (Bellamy, 2012). We used the survey method as they have standardized questions which are phrased in the same way (Sheppard et al., 2020). This was a retrospective survey, as participants were asked to report on past events. Therefore, we gathered longitudinal data on physicians past behavior. The study's data collection tool was questionnaires. According to Bellamy, 2012 questionnaires are good data collection methods in gaining first-hand information. Questionnaires also emphasize the anonymity of the participants. This was a primary study therefore a structured questionnaire, with closed ended questions were completed by participants and returned (Reswell. J.W, 2016).

The researcher approached each of the prospective participants at their practice premises both in the clinics and hospitals. This was through convenience, starting with those that I knew through my professional networks and having them refer their colleagues to me. We informed them of the study and asked for their telephone and email contacts through which we used to send the questionnaires. We then used emails and WhatsApp to disseminate the questionnaire. Web based questionnaires were shared via google forms to the respondents (Reswell. J.W, 2016). Data collection was done between 1st June 2022 and 30th July 2022.

3.6 Research quality

The quality of research is defined as the depth of consistency and accuracy of the instruments used in objective measurement. This shall be done through measurement of the validity and reliability.

3.6.1 Validity

Validity determines whether the results really mirror what they appear to be through accuracy in measurement (Saunders et al., 2019). Internal validity measures the extent to which the study design supports the conclusion that says that changes to the independent variable were responsible for those in the dependent variable. Correlational research, which has been used in this study has the lowest internal validity (Sheppard et al., 2020). This is because it assumes that the changes in the average score on the dependent variables may be because of the independent variable. However, these changes may be affected by other factors such as reversal of the direction of causality. In addition, there may be a third variable resulting in the differences in both the independent and dependent variables (Sheppard et al., 2020).

The study used criterion validity which seeks to ensure that a measure differentiates individuals on a criterion it is expected to predict. In this case, criterion validity was ensured if the scale discriminated difference in scores in the different demographic categories (Sekaran, 2003). On the other hand, external validity means that the study findings would be generalizable in other contexts (Sheppard et al., 2020). This was ensured by using probability sampling method (Bhattacherjee, 2021). Content validity is where the items intended to measure a concept, on the face of it, look like they measure it (Saunders et al., 2019). This was done by reviewing the questions and ensuring they measured the expected concept. Also, we aligned the measures to clearly defined research objectives and their operationalization.

Construct validity, refers to ability to infer findings to the concept being studied ensuring generalizability of findings (Heale & Twycross, 2015). In this case, the study sought to demonstrate the relationships to theory (Sekaran, 2003). This was achieved since the behavior of physicians is relatable to the theoretical assumptions illustrated. This was also reviewed in the discussions, to determine the relationships between the findings and the extent to which it brings out the evidence in the theory of planned behavior. Since

evidence in the findings supported the hypothesis, we concluded that there was a high degree of construct validity in the measurements of factors affecting physician prescribing patterns (Bolarinwa, 2015).

3.6.2 Reliability

Reliability is the extent to which the selected data collection techniques in data analysis will give consistent results (Saunders et al., 2019). This means that each participant that gave responses to the questionnaire had approximately similar responses. This was measured in terms of homogeneity, stability, and equivalence.

Internal consistency measures the extent to which all items on the scale measure a single construct (Heale & Twycross, 2015). We used the Cronbach's α methods to determine the internal consistency of our questionnaire as we had more than two responses. Here, the average of all correlations in every split half combination was determined. The split half combination was determined by dividing the results of the questionnaire by half, then comparing the halves to get the correlations. The Cronbach's α result is any number between 0 and 1, with an acceptable score being equal to or more than 0.7 indicating strong correlations.

Further internal consistency was determined through pilot testing of the questionnaire. Here we took thirty subjects not included in the sample to fill in the questionnaires and have the data analyzed by Statistical Package for Social Sciences(SPSS) to give the 'correlation matrix' and 'view alpha if item deleted' columns (Bolarinwa, 2015). Reliability coefficient (alpha) ranges from 0 to 1, representing non-reliable and reliable respectively. Also, a reliability coefficient (alpha) of equal to or more than 0.70 was considered acceptable reliability in SPSS. This was intended to assess whether the questions should be easily understood among participants and changes made if required. Finally, equivalence was assessed through inter-rater reliability where we sought consistency among responses (Heale & Twycross, 2015). This was achieved by reviewing the level of consistency across all physicians in the scores given to factors affecting their prescribing.

3.7 Data Analysis and Presentation

Data analysis describes methods used to make the research findings simpler through coding, editing, and encoding for ease in comprehension when making conclusions for

the study. Data was cleaned, coded, verified, and analyzed using the Statistical Package for Social Sciences (SPSS) computer version 18.0 software. This study applied quantitative techniques. The different factors were presented as percentages with a 95% confidence interval. In addition, we checked for statistically significant differences between factors using the chi square test. In addition, we used bivariate analysis to analyze relationships between two variables. This data was presented using a contingency table (Sheppard et al., 2020). Data was stored in the Microsoft access database on a computer that has been sufficiently encrypted, and password protected.

3.8 Ethical Considerations

Ethics is defined as the appropriateness of the behavior of the researcher in relation to the participant rights or those that are affected by it (Saunders et al., 2019). Blumerg et al. (2005) defined ethics as the moral principles, standards or norms of behavior which guide decisions about our conduct and relationships. This determined how we formulated and clarified our research topic, designed the study as well as accessed, collected, processed, and stored data. In addition, it defined how the study analyzed and summed up the findings in a moral way.

For this study to meet the expected ethical standards, a letter of introduction from Strathmore University and a research permit from National Commission for Science, Technology, and Innovation (NACOSTI) were obtained. Written informed consent was sought from the target respondents, with voluntariness being stressed and participants given options of dropping out at any time during the study if they so wish. During the process of data collection, we sought to maintain anonymity by not using the participant's names. The study had no monetary compensation for the participants.

In addition, this study was for educational purposes and all collected information was treated with confidentiality as indicated in the consent form. Debriefing material about the factors affecting physician prescribing behavior was provided to participants who had questions following the survey or demonstrated a training need.

CHAPTER 4

DATA ANALYSIS AND PRESENTATION OF THE FINDINGS

4.1 Introduction

The data analysis section provides the results of the study after analyzing the information that was collected. Quantitative analysis, descriptive statistics and inferential statistics were used to give information for making conclusions to the study. The researcher sent 368 electronic questionnaires to the respondents. Out of these, 247 were duly completed and sent back for analysis, representing a 67.1% response rate, as shown in Table 4.1.

Table 4.1: Response Rate

Category	Frequency	Percentage (%)
Filled	247	67.1
Did not fill	121	32.9
Total	368	100

Source: Research Data (2022)

4.2 Demographic Information

This section illustrates the background information of the respondents in relation to their age, education level, years of service and type of institution where they practice.

4.2.1 Age

This section sought to determine the respondents age and is presented on the below table:

Table 4.2.1: Age

Age of the respondent	Frequency	Percent
25–30 years	117	47.4
31 – 35 years	47	19.0
36 – 40 years	52	21.1
above 40 years	31	12.6
Total	247	100.0

Source: Research Data (2022)

The study showed that 47.4% of the respondents were in the 25-30 year' age bracket, 19% were in 31 – 35 years, 21.1% in 36 – 40 years while 12.6% were above 40 years. This meant that most of the respondents were in the prime age believed to have their prescribing affected by multiple factors hence the hence the need to conduct the study.

4.2.2 Education

This section sought to determine the level of education of the respondents and is presented on the table below:

Table 1.2.2: Level of Education

Level of Education	Frequency	Percent
Undergraduate	163	66.0
Postgraduate	69	27.9
Fellow	15	6.1
Total	247	100.0

Source: Research Data (2022)

The results of the study showed that 66.0% of the respondents had an undergraduate degree, 27.9% have a postgraduate degree while only 6.1% had a fellowship in a relevant discipline. The findings implied that there was uneven distribution in the education levels among physicians with the majority being younger in the profession. In addition, this would point towards the proportion of physicians that attend to the larger patient population. This group of respondents would be more prone to influence as compared respondents with an advanced level of education.

4.2.3 Years of Service

This section sought to establish the years of service of the respondents and is presented on the table below:

Table 4.2.3: Years of Service

Years of Service	Frequency	Percent
Less than 1 year	46	18.6
1 – 3 years	76	30.8
4 – 6 years	67	27.1
above 6 years	58	23.5
Total	247	100.0

Source: Research Data (2022)

In estimating the respondents' years of service, the study revealed that 18.6% of the respondents had less than a year in service, 30.8% had 1-3years, 27.1% had 4 – 6 years, and 23.5% had above 6 years in service. This finding helps the researcher to understand the respondents' level of experience and the impact on their prescribing. The findings implied that there was uneven distribution in the years of service with the majority having less than 6 years of experience. This group would be more prone to influence in their decision making.

4.2.4 Institution of Practice

This section sought to establish the institution of practice of the respondents and is presented on the table below.

Table 4.2.4: Institution of Practice

Institutions of Practice	Frequency	Percent
Public Only	79	32.0
Private Only	44	17.8
Faith Base	16	6.5
Public and Private	77	31.2
All the above	31	12.6
Total	247	100.0

Source: Research Data (2022)

In estimating the respondents' institution of practice, the study showed that 32% of the respondents only worked in public instructions, 31.2% worked in both public and private institutions, 17.8% only worked in private institutions, 12.6% worked in private, public, and faith-based institutions and only 6.5% worked in faith-based institutions. This finding enables the study to relate the institution of practice to their prescribing habits and how the various factors may be affected by this.

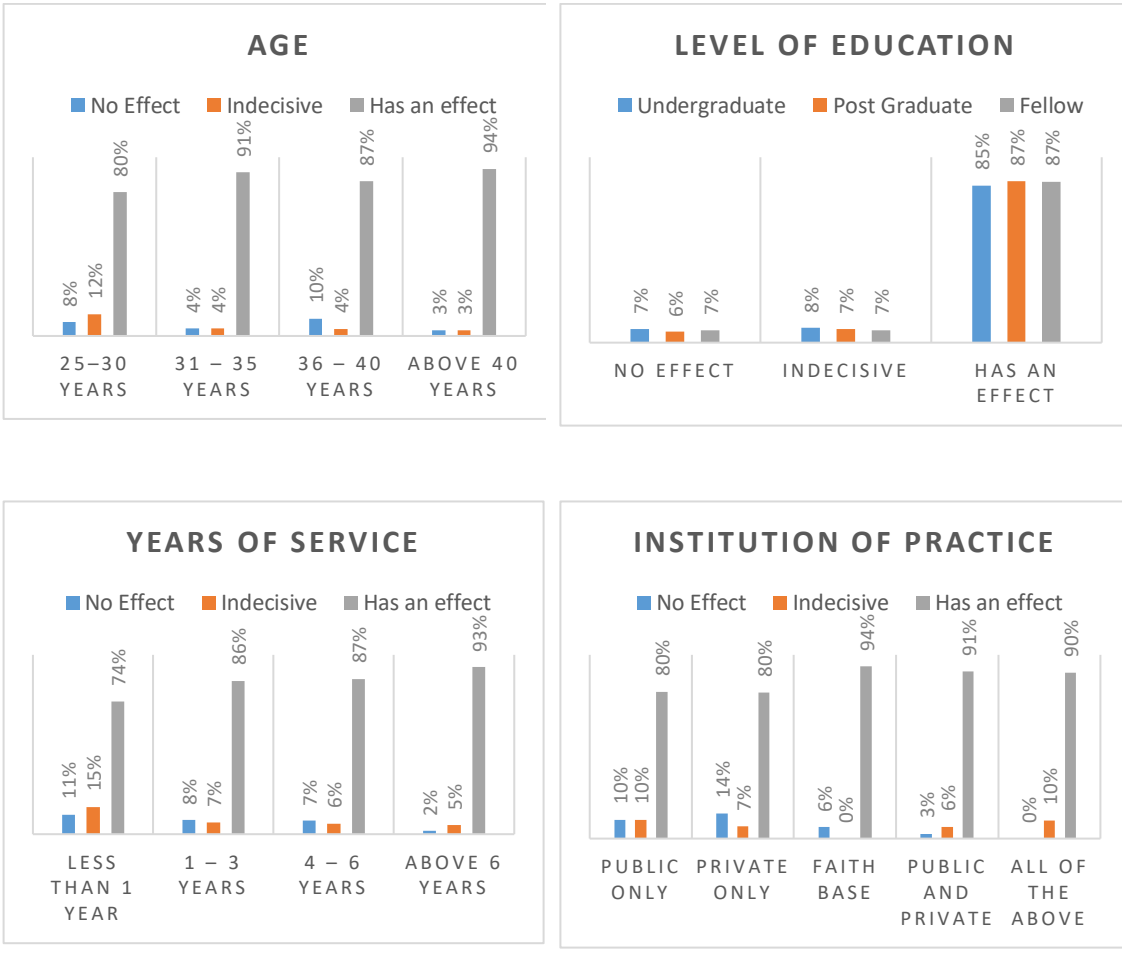
4.3 Descriptive Statistics

This section provides the results on whether there was a relationship between the preference of generic prescribing by physicians practicing in Nairobi County and their demographic characteristics. In addition, the section shall provide findings on whether there was a relationship between physician prescribing with product, physician, patients, payers, environmental and pharmaceutical factors. The study used frequency's, percentages, tables, and graphs.

4.3.1 Preference for Generic to Branded Medication

This section provides information on the relationship between generic prescribing and the**ir** demographics characteristics.

Figure 4. 3.1: Demographic characteristics and Generic Prescribing



Source: Research Data (2022)

The results in figure 4.3.1 further show the relationship between the different age groups and generic prescribing. 94 (80%) of respondents at 25-30years, 43 (91%) of respondents at 31 to 35years ,45 (87%) of respondents at 36-40years and 29 (94%) of respondents at > 40years of the respondents preferred prescribing generic medication. This variation indicates that generic prescribing changes with the age of the physician with the older physician having the highest preference. This indicates that age comes with exposure in prescribing of medication and therefore subsequent experience with both generic and branded medication.

The findings in figure 4.3.1 further show the relationship between the different levels of education and prescribing. 138 (85%) of respondents with an undergraduate degree, 609 (87%) of respondents with a postgraduate degree while 13 (87%) with a fellowship

preferred prescribing generic medication. This variation indicates that generic prescribing changes with the level of physician education with the physician at a higher level of education having the highest preference. This indicates that higher levels of education come with further training in medication and therefore subsequent knowledge of both generic and branded medication.

The findings in figure 4.3.1 also imply that the majority of respondents preferring to prescribe generic medication have over 6years of clinical experience with a frequency of 54. This represented 93% of the total respondents in this category. This is followed by those with 4-6years of clinical experience at a frequency of 58 (87%), 1-3 years with 65 (86%) and finally less than 1year with 34 (74%) of the total respondents in these categories. This variation indicates that generic prescribing increases with more years of clinical experience. This indicates that years of practice comes with more clinical experience with both generic and branded medication.

Finally, the findings in figure 4.3.1 show that most of the respondents working in faith-based institutions preferred prescribing generic medication with a frequency of 15 (94%) of respondents. 70 of the respondents working in both public and private institutions preferred to prescribe generic medication representing 91% of the respondents in this category. However, 80% of the respondents in the category working in public institutions and private institutions only each preferred generic prescribing. This variation indicates that generic prescribing changes with where physicians practice. This may be influenced by the socio-economic status of the patients visiting these facilities.

Table 4.3.1: Extent of Generic Prescribing

The study further determined the overall extent of generic prescribing behavior by physicians.

Extent of Prescribing		Frequency	Percent
	Disagree	17	6.9
	Not Sure	19	7.7
	Agree	140	56.7
	Strongly Agree	71	28.7
	Total	247	100.0

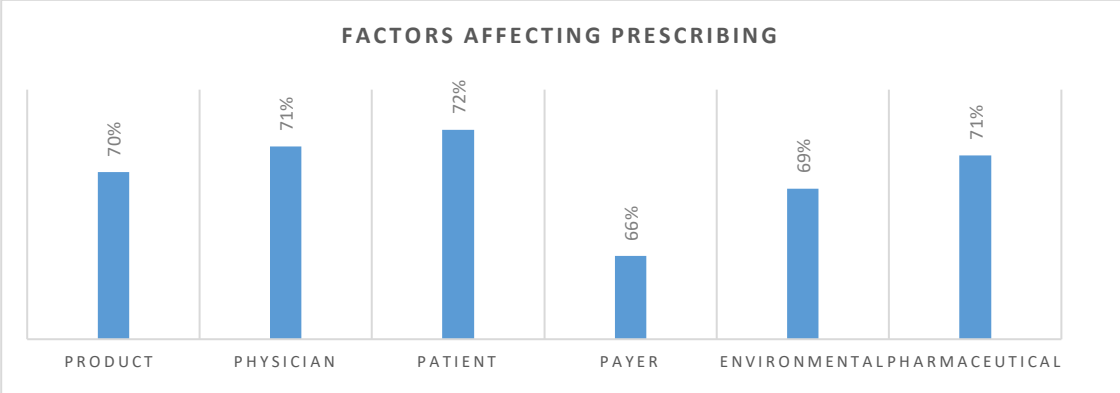
Source: Research Data (2022)

The results in table 4.3.1 indicate that 85.4% of all respondents preferred prescribing generic medication over branded medication. This represented 211 of the 247 respondents. Results showed that 56.7% of the respondents agreed while 28.7% strongly agreed that they preferred generic prescribing. However, 7.7% disagreed that they prescribed generic medication while 6.9% strongly disagreed. The study findings showed that there was uneven distribution on the extent of prescribing generic over branded medication by the physicians. Therefore, the study went further to compare if there would be variation affected by the different factors.

4.3.2 Factors Affecting Generic Prescribing.

This section provides information on the relationship between prescribing of generic medication and the product, physician, patients, payers, environmental and pharmaceutical factors. The study findings in figure 4.3.2 imply that the preference of generic medication varied among the factors. Patient factors had the highest impact at 72% followed by physician and pharmaceutical factors at 71%. However, payer factors had the least impact at 66%. This variation indicates that prescribing is affected by different factors hence the need to go further and determine the impact of each individual factor.

Figure 4.3.2: Factors affecting Generic Prescribing

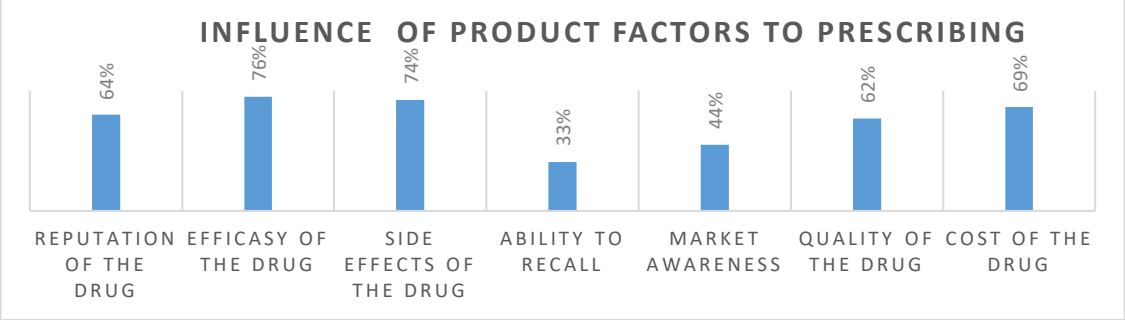


Source: Research Data (2022)

4.3.3 Product Related Factors

Under the first objective of the study, the individual product related factors were assessed to determine their impact towards the prescribing patterns of antihypertensives by physicians.

Figure 4.3.3: Product factors affecting Generic Prescribing



Source: Research Data (2022)

The study findings in figure 4.3.3 indicate that generic prescribing was affected by the different product factors. Efficacy and side effects had the highest influence at 76% (188) and 74% (183) of the respondents respectively. The cost, reputation and quality of the drug had moderate effects on prescribing at 69% (171), 64% (158) and 62% (152) of the respondents respectively. However, patients' ability to recall their drug regimen and awareness of the drug in the market had the least influence at 33% (81) and 44% (109)

respectively. This variation indicates that not all product factors affect prescribing in the same proportion hence the needs for awareness of those that have most impact.

Table 4.3.3: Extent of Product Factors Affecting Generic Prescribing

The study showed the extent of product factors on prescribing behavior of physicians.

Extent of Influence	Frequency	Percent
Strongly disagree	10	4.0
Disagree	12	4.9
Not Sure	21	8.5
Agree	147	59.5
Strongly Agree	57	23.1
Total	247	100.0

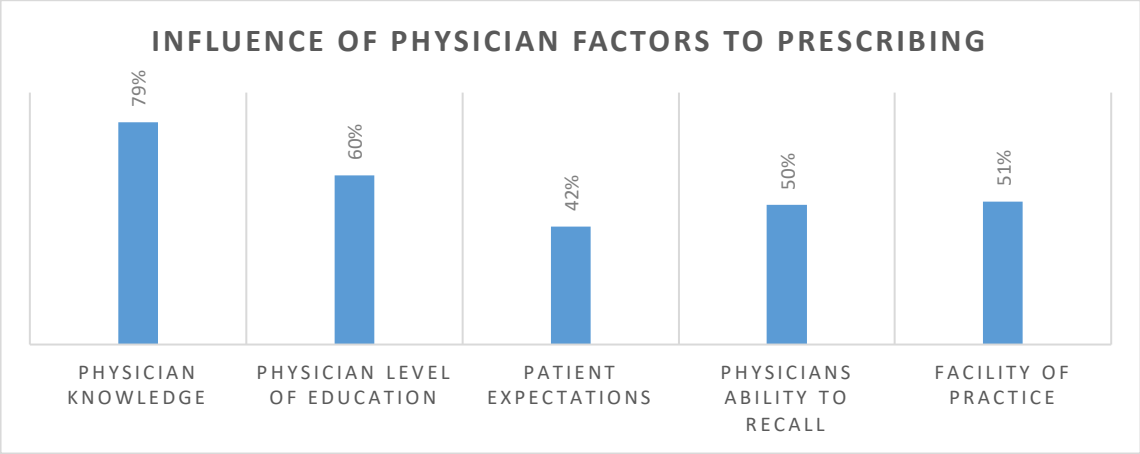
Source: Research Data (2022)

Results implied that 59.5% agreed, 23.1% strongly agreed,4.9% disagreed while 4% strongly disagreed that product factors had an impact towards prescribing. The study findings showed that there was uneven distribution on the extent of influence of product factors on physician prescribing.

4.3.4 Physician Related Factors

Under the second objective of the study, the individual physician related factors were assessed to determine their impact towards their prescribing patterns of antihypertensives.

Figure 4.3.4: Physician factors affecting Generic Prescribing



Source: Research Data (2022)

The study findings in figure 4.3.4 indicate that generic prescribing was affected by the different physician factors. Physician knowledge had the highest influence as indicated by 79% (196 of total respondents). Physician level of education had some impact with a percentage of 60% (149 of total respondents). In addition, physician ability to recall and facility of practice had moderate influence as indicated by 50% (123 of total respondents) and 51% (126 of the respondents) respectively. However, patient expectations had the least influence at 42% (104 of total respondents). This variation indicates that not all physician factors affect prescribing in the same proportion hence the needs for awareness of those that have most impact.

Table 4.3.4: Extent of Physician Factors Affecting Generic Prescribing

The study showed the extent of physician factors on their prescribing behavior.

Extent of Influence	Frequency	Percent
Strongly disagree	9	3.6
Disagree	14	5.7
Not Sure	21	8.5
Agree	132	53.4
Strongly Agree	71	28.7
Total	247	100.0

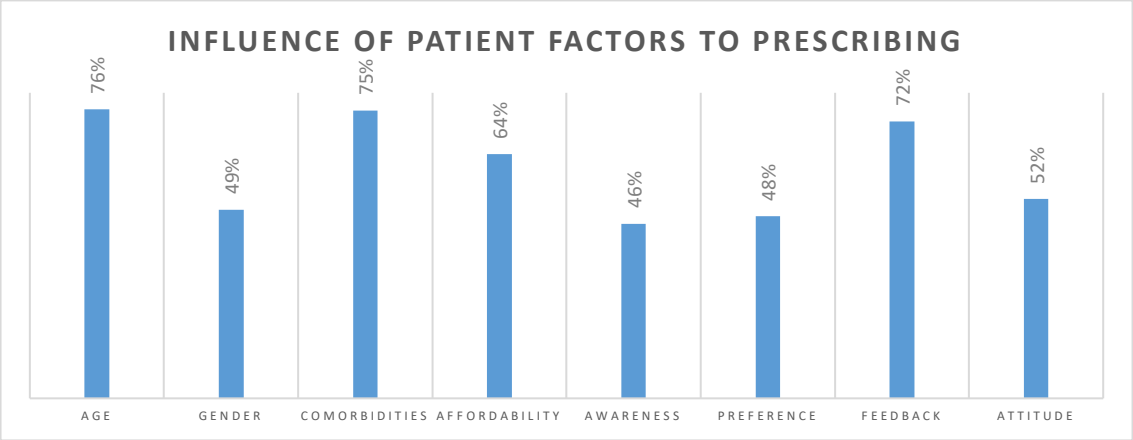
Source: Research Data (2022)

Results showed that 53.4% agreed, 28.7% strongly agreed, 5.7% disagreed while 3.6% strongly disagreed that physicians' factors had an impact towards prescribing. The study findings showed that there was uneven distribution on the extent of influence of physician factors on physician prescribing.

4.3.5 Patient Factors

The third study objective was to determine the influence of patient factors on the prescribing patterns of antihypertensives by physicians. The findings illustrated below depict their relative opinion.

Figure 4.3.5: Patient factors and generic prescribing



Source: Research Data (2022)

The study findings in figure 4.3.5 indicate that generic prescribing was affected by the different patient factors. Patients age, comorbidities, feedback had the highest influence as indicated by 76% (187), 75% (186) and 72% (179) of the respondents respectively. Patient gender, preference and awareness of the medication had the least impact with a percentage of 49% (122), 48% (118) and 46% (121) of the total respondents respectively. This variation indicates that not all patient factors affect prescribing in the same proportion hence the needs for awareness of those that have most impact.

Table 4.3.5: Extent of Patient factors affecting Generic Prescribing

The study showed the extent of patient factors on prescribing behavior of physicians.

Extent of Influence	Frequency	Percent
Strongly disagree	6	2.4
Disagree	10	4.0
Not Sure	28	11.3
Agree	148	59.9
Strongly Agree	55	22.3
Total	247	100.0

Source: Research Data (2022)

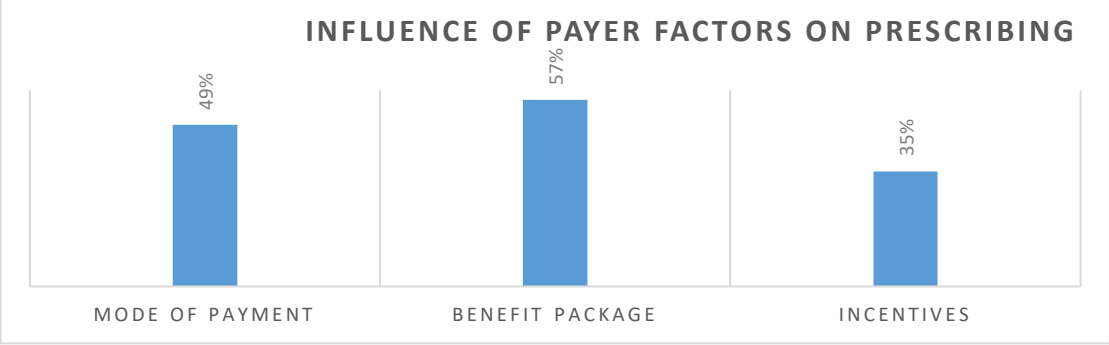
Results showed that 59.9% agreed, 22.3% strongly agreed,4.0% disagreed while 2.4% strongly disagreed that patient factors have an impact towards prescribing. The study findings showed uneven distribution on the extent of influence of physician factors on physician prescribing.

4.3.6 Payer Factors

The fourth study objective was to determine the influence of payer factors towards the prescribing patterns of antihypertensives by physicians.

The findings illustrated below depict their relative opinion.

Figure 4.3.6: Payer factors and generic prescribing



Source: Research Data (2022)

The study findings in figure 4.3.6 indicate that generic prescribing was minimally affected by the different payer factors. The benefit package had the highest influence as indicated by 57% (141) of the respondents. The mode of payment and incentives from

third party payers has the least impact with a percentage of 49% (122) and 35% (87) of the total respondents respectively. This variation indicates that payer factors had the least impact towards prescribing with varying proportions hence the needs for awareness of those that have most impact.

Table 4.3.6: Extent of Payer factors affecting Generic Prescribing

The study further showed the extent of payer factors on prescribing behavior of physicians.

Extent of Influence	Frequency	Percent
Strongly disagree	10	4.0
Disagree	20	8.1
Not Sure	34	13.8
Agree	151	61.1
Strongly Agree	32	13.0
Total	247	100.0

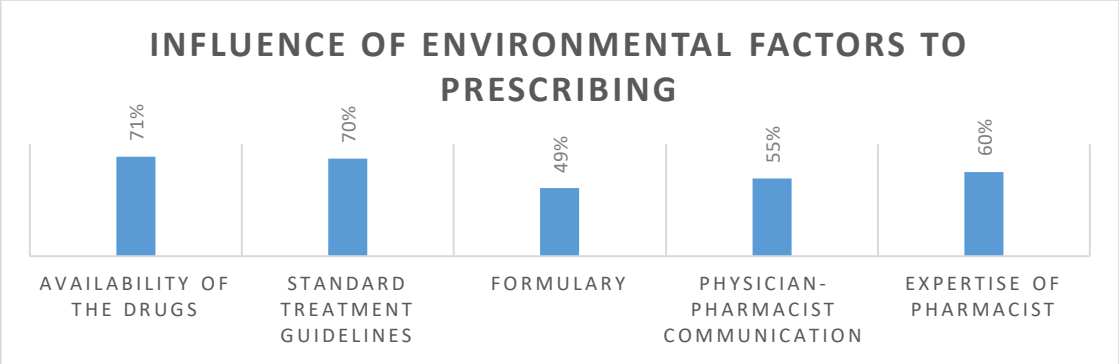
Source: Research Data (2022)

Results showed that 61.1% agreed, 13.8% strongly agreed,8.1% disagreed while 4% strongly disagreed that payer factors had an impact towards prescribing. The study findings showed that there was uneven distribution on the extent of influence of payer factors on physician prescribing.

4.3.7 Environmental Factors

The fifth study objective was to determine the influence of environmental related factors on the prescribing patterns of antihypertensives by physicians. The findings illustrated below depict their relative opinion.

Figure 4.3.7: Environmental factors and generic prescribing



Source: Research Data (2022)

The study findings in 4.3.6 indicate that generic prescribing was affected by different environmental factors. The availability of the drugs and standard treatment guidelines had the highest influence as indicated by 71% (176) and 70% (172) of the respondents. The hospital formulary has the least impact with a percentage of 49% (120) of the total respondents. This variation indicates that environmental factors affected prescribing with varying proportions hence the needs for awareness of those that have most impact.

Table 4.3.7: Extent of Environmental factors affecting Generic Prescribing

The study further determined the extent of environmental factors on prescribing behavior of physicians.

Extent of Influence	Frequency	Percent
Disagree	21	8.5
Not Sure	28	11.3
Agree	149	60.3
Strongly Agree	49	19.8
Total	247	100.0

Source: Research Data (2022)

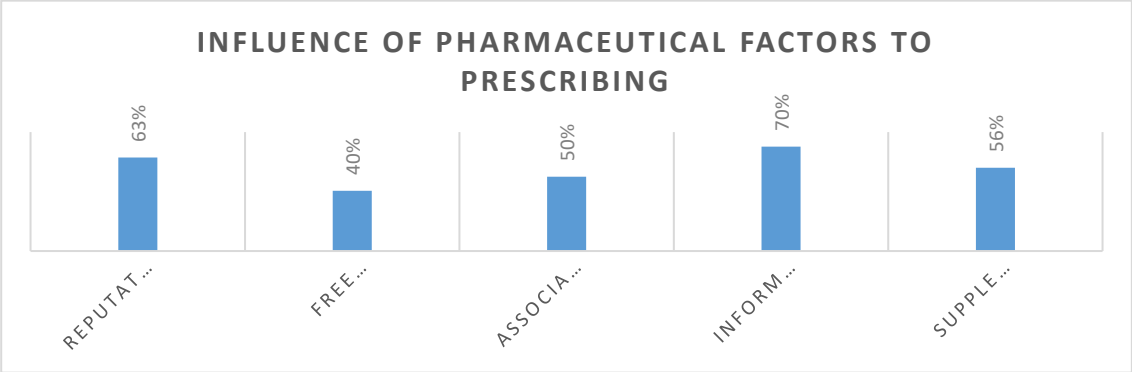
Results showed that 60.3% agreed, 19.8% strongly agreed,11.3% disagreed while 8.5% strongly disagreed. The study findings showed that there was uneven distribution of the extent of environmental factors on physician prescribing.

4.3.8 Pharmaceutical Factors

The last objective of the study was to determine the influence of pharmaceutical factors towards the prescribing patterns of antihypertensives by physicians.

The findings illustrated below depict their relative opinion.

Figure 4.3.8: Pharmaceutical factors and generic prescribing



Source: Research Data (2022)

The findings in figure 4.3.7 indicate that generic prescribing was affected by the different pharmaceutical factors. The information gathered by physicians from medical representatives had the highest influence as indicated by 70% (173) of the respondents. The reputation of the pharmaceutical company, supplementary incentive and association with pharmaceutical companies had moderate influence at 63% (155), 56% (138) and 50% (123) respectively. Free samples had the least impact with a percentage of 40% (100) of the total respondents. This variation indicates that pharmaceutical factors had uneven impact towards prescribing with varying proportions hence the needs for awareness of those that have most impact.

Table 4.3.8: Extent of Pharmaceutical factors affecting Generic Prescribing

The study further determined the extent of pharmaceutical factors on prescribing behavior of physicians.

Extent of Influence	Frequency	Percent
Strongly disagree	1	.4
Disagree	33	13.4
Not Sure	19	7.7
Agree	135	54.7
Strongly Agree	59	23.9
Total	247	100.0

Source: Research Data (2022)

Results showed that 54.7% agreed, 23.9% strongly agreed,13.4% disagreed while 0.4% strongly disagreed. The study findings showed that there was uneven distribution on the extent of influence of physician factors on physician prescribing.

4.4 Inferential Statistics

The section shows findings on the correlation and regression analysis of the study.

4.4.1 Spearman ranked Correlation Analysis

Spearman's correlation analysis was done to show the relationship between the study variables.

Table 4.4.1: Spearman Correlation Analysis Results

		Product factors	Physician factors	Patient factors	Payer factors	Environmental factors	Pharmaceutical factors	Generic Prescribing
Product factors	Correlation Coefficient	1.000	.176**	.075	.052	.063	.055	-.064
	Sig. (2-tailed)		.006	.240	.415	.327	.389	.313
	N	247	247	247	247	247	247	247
Physician factors	Correlation Coefficient	.176**	1.000	.157*	.146*	.056	.076	.003
	Sig. (2-tailed)	.006		.013	.022	.385	.233	.968
	N	247	247	247	247	247	247	247
Patient factors	Correlation Coefficient	.075	.157*	1.000	.066	.079	.113	-.011
	Sig. (2-tailed)	.240	.013		.304	.216	.076	.858
	N	247	247	247	247	247	247	247
Payer factors	Correlation Coefficient	.052	.146*	.066	1.000	.260**	.138*	.206**
	Sig. (2-tailed)	.415	.022	.304		.000	.030	.001
	N	247	247	247	247	247	247	247
Environmental factors	Correlation Coefficient	.063	.056	.079	.260**	1.000	.038	.154*
	Sig. (2-tailed)	.327	.385	.216	.000		.553	.015
	N	247	247	247	247	247	247	247
Pharmaceutical factors	Correlation Coefficient	.055	.076	.113	.138*	.038	1.000	.191**
	Sig. (2-tailed)	.389	.233	.076	.030	.553		.003
	N	247	247	247	247	247	247	247
Generic Prescribing	Correlation Coefficient	-.064	.003	-.011	.206**	.154*	.191**	1.000
	Sig. (2-tailed)	.313	.968	.858	.001	.015	.003	
	N	247	247	247	247	247	247	247

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

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Research Data (2022)

There was a very weak positive correlation between product and physician factors with prescription behavior of antihypertensives among physicians with correlation coefficients of -.064, .003 respectively. Their significance levels were above .05. Further, payer, environmental and pharmaceutical factors had a weak positive correlation with prescription behavior with correlation coefficients of .206**, .154* and .191** respectively. However, their significance level for payer and pharmaceutical factors was below .05 level of significance. On the other hand, the significance level of environmental factors was above .05 significance level.

Finally, there was a very weak negative correlation between patient factors and prescription behavior of antihypertensives among physicians with correlation coefficients of -.011. Their significance levels were above .05.

The results of positive correlation coefficient therefore implied that physician, product, payer, environmental and pharmaceutical factors correlate positively with prescription behavior among physicians. On the contrary the negative correlation coefficient results therefore implied that patient factors correlate negatively with prescription behavior among physicians.

4.4.2 Logistics Regression Analysis

This analysis was used to show the Case Processing summary where the marginal percentage was used to measure the varied effects of the different factors affecting prescribing were observed. In addition, the analysis was used to fit data into the fitted model where the Chi square was used to explain the variations in prescribing behavior of physicians because of changes in product, physician, patient, payer, environmental and pharmaceutical factors.

The Pearson model in analysis of variance Chi square was used to measure the models goodness of fit. Finally, regression coefficient summary was done to explain the relationship between independent variables (product, physician, patient, payer, environmental and pharmaceutical factors) and dependent variable prescribing behavior in the study.

Table 4.4.2: Case Processing Summary

		N	Marginal Percentage
I do prescribe generic drugs more often than branded drugs	Disagree	17	6.9%
	Not Sure	19	7.7%
	Agree	140	56.7%
	Strongly Agree	71	28.7%
Product related factors are important in influencing the prescribing behavior of generic anti-hypertensive drugs	Strongly disagree	10	4.0%
	Disagree	12	4.9%
	Not Sure	21	8.5%
	Agree	147	59.5%
	Strongly Agree	57	23.1%
Physician factors are important in influencing their prescribing behavior of generic anti-hypertensive drugs	Strongly disagree	9	3.6%
	Disagree	14	5.7%
	Not Sure	21	8.5%
	Agree	132	53.4%
	Strongly Agree	71	28.7%
Patient factors are important in influencing the prescribing behavior of generic anti-hypertensive drugs?	Strongly disagree	6	2.4%
	Disagree	10	4.0%
	Not Sure	28	11.3%
	Agree	148	59.9%
	Strongly Agree	55	22.3%

Payer related factors are important in influencing the prescribing behavior of generic anti-hypertensive drugs	Strongly disagree	10	4.0%
	Disagree	20	8.1%
	Not Sure	34	13.8%
	Agree	151	61.1%
	Strongly Agree	32	13.0%
Environmental factors are important in influencing the prescribing behavior of generic anti-hypertensive drugs	Disagree	21	8.5%
	Not Sure	28	11.3%
	Agree	149	60.3%
	Strongly Agree	49	19.8%
Pharmaceutical related factors are important in influencing the prescribing behavior of generic anti-hypertensive drugs	Strongly disagree	1	.4%
	Disagree	33	13.4%
	Not Sure	19	7.7%
	Agree	135	54.7%
	Strongly Agree	59	23.9%
Valid		247	100.0%
Missing		0	
Total		247	

Source: Research Data (2022)

The case processing summary shows that 56.7 % of the physicians agreed that they preferred prescribing generic medication over branded medication, while 28.7% strongly agreed. The model also goes further to show the proportion of respondents that agreed that physician prescribing was influenced by various factors at varying degrees indicating unevenness in their contribution. Product related factors had the highest impact on prescribing as shown by 82.59 % of the responses. This was represented by 59.5% and 23.1% of the respondents agreeing and strongly agreeing respectively. This was followed closely by physician and patient factors by 82.19% of the responses. This was represented

by 53.4%, 28.7% and 53.4%, 28.7% of the respondents agreeing and strongly agreeing respectively that physician factors had an impact to their prescribing decisions. However, payer factors had the least impact to prescribing evidenced by 74.09% of the responses. This is evidenced by 61.1% and 13.9% of the respondents agreeing and strongly agreeing respectively.

Table 4.4.3: Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	422.329			
Final	372.982	49.348	23	.001

Link function: Logit.

Source: Research Data (2022)

The significant value of the model was .001 which is < 0.05. This means that the model is fit as there is a significant difference between the baseline model and final model.

Table 4.4.4: Goodness-Of-Fit

	Chi-Square	Df	Sig.
Pearson	635.168	433	.000
Deviance	327.599	433	1.000

Link function: Logit.

Source: Research Data (2022)

This tests whether the observed data is consistent with the fitted model. The significant value of the model was .000 which is < 0.05. This means that the observed data is not having goodness of fit with the fitted data therefore there is no significant difference between the baseline model and the final model.

Table 4.4.5: Pseudo R-Square

Cox and Snell	.181
Nagelkerke	.206
McFadden	.094

Link function: Logit.

Source: Research Data (2022)

The Pseudo R^2 of the model was estimated using the Nagelkerke that is shown as .206 and should be 0.7. This therefore shows that the model predicts that the variance explained by the independent variables (product, physician, patient, payer, environmental and pharmaceutical factors) on the dependent variable (physician prescribing) in the regression model by 20.6%. The remaining proportion is explained by the sub-factors under the main factors. Therefore, more independent variables should be selected.

Table 4.4.6: Parameter Estimates

		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[Generic Prescribing = 2]	-4.671	.644	52.530	1	.000	-5.934	-3.408
	[Generic Prescribing = 3]	-3.746	.610	37.750	1	.000	-4.941	-2.551
	[Generic Prescribing = 4]	-.604	.558	1.172	1	.279	-1.697	.489
Location	[Product factors =1]	1.131	.862	1.721	1	.190	-.559	2.821

	[Product factors=2]	1.089	.729	2.235	1	.135	-.339	2.517
	[Product factors=3]	.175	.552	.100	1	.752	-.908	1.257
	[Product factors=4]	-.165	.342	.235	1	.628	-.835	.504
	[Product factors=5]	0[a]			0			
	[Physician factors=1]	.434	.841	.267	1	.606	-1.214	2.081
	[Physician factors=2]	.359	.636	.318	1	.573	-.888	1.606
	[Physician factors=3]	.280	.557	.253	1	.615	-.811	1.371
	[Physician factors=4]	-.219	.329	.443	1	.506	-.864	.426
	[Physician factors=5]	0[a]			0			
	[Patient Factors=1]	.495	1.084	.208	1	.648	-1.629	2.619
	[Patient factors=2]	.189	.750	.063	1	.801	-1.281	1.659
	[Patient factors=3]	-.061	.504	.015	1	.904	-1.048	.927
	[Patient factors=4]	.350	.337	1.082	1	.298	-.310	1.010
	[Patient factors=5]	0[a]			0			
	[Payer Factors=1]	-1.706	.786	4.713	1	.030	-3.247	-.166

	[Payer Factors=2]	-1.182	.633	3.482	1	.062	-2.423	.060
	[Payer Factors=3]	-1.099	.568	3.746	1	.053	-2.211	.014
	[Payer Factors=4]	-1.021	.430	5.629	1	.018	-1.865	-.178
	[Payer Factors=5]	0[a]			0			
	[Environmental factors=2]	-.511	.574	.794	1	.373	-1.635	.613
	[Environmental factors=3]	-.886	.523	2.872	1	.090	-1.910	.139
	[Environmental factors=4]	-.338	.373	.821	1	.365	-1.068	.393
	[Environmental factors=5]	0[a]			0			
	[Pharmaceutical factors=1]	-.599	2.190	.075	1	.785	-4.892	3.695
	[Pharmaceutical factors=2]	-.986	.501	3.869	1	.049	-1.969	-.004
	[Pharmaceutical factors=3]	-2.440	.594	16.901	1	.000	-3.604	-1.277
	[Pharmaceutical factors=4]	-.391	.335	1.366	1	.243	-1.048	.265
	[Pharmaceutical factors=5]	0[a]			0			

Link function: Logit.

a. This parameter is set to zero because it is redundant.

Source: Research Data (2022)

The parameter estimates show the likelihood of prescribing as influenced by the various parameters. Of note are differences in each factor meaning that the location parameters (product, physician, patient, payer, environmental, pharmaceutical factors) are not the same across the response categories (strongly disagree to strongly agree). In addition, the patient, physician, and product factors have positive estimates therefore are more likely to influence prescribing. However, payer, environmental and pharmaceutical factors which have negative estimates therefore are less likely to influence prescribing.

However, the significance value in all parameters except pharmaceutical factors is more than 0.05 level of significance implying that their impact on prescribing among was insignificant.

Table 4.4.7: Test of Parallel Lines

Model	-2 Log Likelihood	Chi-Square	Df	Sig.
Null Hypothesis	372.982			
General	290.581[b]	82.401[c]	46	.001

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

b. The log-likelihood value cannot be further increased after maximum number of step-halving.

c. The Chi-Square statistic is computed based on the long-likelihood value of the last iteration of the general model. Validity of the test is uncertain.

Source: Research Data (2022)

The significance value is <0.05 therefore this means that the location parameters (product, physician, patient, payer, environmental, pharmaceutical factors) are not the same across the response categories (strongly agree to strongly disagree).

CHAPTER 5

SUMMARY, DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter highlights the discussion, conclusion of the study, and recommendations. In addition, it discusses the summary of the research based on the research objectives, methodology and the descriptive findings. Finally, the chapter includes areas of further study and study limitations.

5.2 Summary of Research Findings

The research objective was to determine the influence of the various factors affecting the prescribing of generic antihypertensive medication among physicians practicing in Nairobi, County. The specific objectives were to determine the influence of product, physician, patients, payers, environmental and pharmaceutical factors on prescribing of generic antihypertensive medication among physicians.

This study used a descriptive research design using the quantitative approach. The population of the study was drawn from physicians in active clinical practice in hospitals and clinics in Nairobi County. A survey was taken on 368 consultants, general practitioners, and medical interns. Findings showed that most of the respondents participated in the study, were between the age bracket of 25 to 30 years and had an undergraduate level of education. In addition, many of them had between 1-3years of service and worked in both private and public facilities.

In addition, findings also show that most physicians preferring to prescribe generic antihypertensive medication were over 40years of age and had a postgraduate and fellowship degree. Also, most of those preferring prescribing generic antihypertensives had more clinical experience with over 6years experience and worked in faith-based institutions. The study findings also showed that there was a weak positive correlation between product, physician, payer, environmental and pharmaceutical factors with prescribing behavior of physicians for generic anti-hypertensive drugs. Only patient factors had a weak negative correlation with prescription behavior of generic antihypertensives among physicians.

5.3 Discussion

This chapter highlights the discussion of the study results based on the objectives. It compares the results and the scholarly reviews on the literature review section of the study.

5.3.1 Influence of product factors

The results showed that many of the respondents agreed that product factors had an effect towards physician prescribing behavior. This indicated a positive relationship between product factors and prescribing. A weak positive correlation existed between product factors and prescribing behavior of anti-hypertensive medication among physicians in Nairobi County. This was supported by previous studies that indicated that product factors had an impact towards generic prescribing by physicians (Davari et al., 2018). However, with a p-value higher than the recommended level of significance, the influence of product factors cannot be significant in influencing the physician prescribing behavior of anti-hypertensive medication.

The findings illustrate that product factors such as efficacy and side effects had the highest influence on prescribing behavior. Also cost, reputation and quality had moderate influence on prescribing. However, the patient's ability to recall their medication regimen and awareness of the drug in the market had the least influence on physician prescribing. The study agreed with the previous studies that found that effectiveness, quality and side effects determines physicians opinions on generic medication(Mohanty et al., 2010); (Colgan et al., 2015). This therefore had an impact toward their prescribing decisions of generic antihypertensives. In addition, the study agreed with previous studies by Cameroon et al, 2012; Toverud et al 2015; Hart et al, 1997; Ryan et al, 1996 that found that the cost of medication determines the physician prescribing decisions.

5.3.2 Influence of physician factors

The study results revealed that most respondents concurred that physician factors had an impact on their prescribing behavior. This indicated a positive relationship between physician factors and prescribing. There was a weak positive correlation between physician factors and their prescription behavior of anti-hypertensive medication. This was reinforced by previous studies that indicated that physician factors had an impact towards generic prescribing by physicians (Davari et al., 2018) However, with a p-value

higher the recommended level of significance, the influence of physician factors cannot be significant in influencing the prescription behavior of anti-hypertensive medication by physicians in Nairobi County.

The findings illustrate that physician factors such as their knowledge had the highest influence on prescribing behavior. This is most likely influenced by their level of education evidenced by the moderate influence on prescribing. However, their ability to recall the medication, facility of practice and knowledge of the expectations by their patients had the least influence on their prescribing behavior.

The study agreed with a previous study by Kasliwal, 2013 who found that younger physicians are more likely to have differing opinion as compared to the older ones. This may be attributed to their knowledge and clinical exposure by their years of experience. In addition, the knowledge of physician's expectations by their patients affected their prescribing. Once of these expectations is affordability and the effectiveness of the medication. This study agrees with the previous ones by Hassali et al 2014; Dunne, et al 2014; Patel et al, 2015; Dunne et al, 2015 that found that the cost of medication and their effectiveness are significant expectations by patients. Therefore, the prescribing by physicians ensures that these expectations are met.

5.3.3 Influence of patient factors

The study findings revealed that some of the respondents agreed that patient factors had an effect towards their prescribing behavior. This indicated a positive relationship between patient factors and prescribing. This was supported by previous studies that indicated that patient factors had an impact towards generic prescribing by physicians(Davari et al., 2018). There was a weak negative correlation between patient factors and their prescription behavior of anti-hypertensive drugs. The negative correlation coefficient results therefore implied that patient factors correlate negatively with prescription behavior among physicians. However, with a p-value higher than the recommended level of significance, the influence of patient factors cannot be significant in influencing the prescription behavior of anti-hypertensive drugs by physicians in Nairobi County.

The findings illustrate that patient factors such as their age, comorbidities and their feedback had the highest influence on prescribing behavior. This is most likely influenced

by the need to ensure that their treatment is optimized to ensure better quality of life; However, their gender, preference for medication and their awareness of options in treatment of hypertension had the least influence on their prescribing behavior. The study agreed with a previous one by Hamada et al., 2020, who revealed that the patients desire expressed through feedback had an impact towards physician prescribing. However, it revealed there was preference for a physician led process in the switch. This may be attributed to the patient's confidence in their physicians led by the confidence that they would have built over time. Therefore, the over reliance by patients on physicians' choices has a significant influence by physicians towards their prescribing of generic medication. However, the study disagreed with previous studies by Kobayashi, Abe, & Satoh, 2019: Kobayashi et al, 2011: Kjoenniksen et al, 2006, who found that the patients age and gender have no impact towards patients choice of generic medication.

5.3.4 Influence of payer factors

The results of the study showed that some of the respondents agreed that payer factors had an effect towards their prescribing behavior. This indicated a positive relationship between payer factors and prescribing. This was reinforced by previous studies that indicated that payer factors had an impact towards generic prescribing by physicians(Davari et al., 2018).

There existed a weak positive correlation between payer factors and their prescribing behavior of anti-hypertensive drugs. The positive correlation coefficient results implied that payer factors correlate positively with prescription behavior among physicians. However, with a p-value lower than the recommended level of significance, the influence of payer factors can be significant in influencing the prescription behavior of anti-hypertensive drugs by physicians in Nairobi County. The findings illustrate that payer factors such as the benefit package had the highest influence on prescribing behavior. This determines the affordability of the medication. However, the mode of payment and incentives had the least influence towards their prescribing behavior.

The study agreed with a previous study by Devari et al, 2018, who found that financial incentives, level of reimbursement of pharmaceuticals and mode of payment by the patients have an impact towards generic prescribing. Similarly, the study agreed with previous studies by Reichert et al, 2000: Rafferty et al, 1997, who found that the insurance

benefit package had an impact towards physician prescribing. Finally, the study agreed with an earlier study by Roberts et al, 1997 who showed that incentives to the prescriber have an impact towards generic prescribing. This may be attributed to the need to ensure affordability of the medication as management of hypertension is long term and would require significant financial investments.

5.3.5 Influence of environmental factors

The results of the study showed that some of the respondents agreed that environmental factors had an effect towards their prescribing behavior. There was a positive relationship between environmental factors and prescribing. This was supported by previous studies that indicated that environmental factors had an impact towards generic prescribing by physicians(Davari et al., 2018).

There existed a weak positive correlation between environmental factors and their prescribing behavior of anti-hypertensive drugs. The positive correlation coefficient results implied that environmental factors correlate positively with prescription behavior among physicians. However, with a p-value higher than the recommended level of significance, the influence of environmental factors cannot be significant in influencing the physician prescribing behavior of anti-hypertensive drugs in Nairobi County. The findings illustrate those environmental factors such as the availability of medication and standard treatment guidelines had the highest influence on prescribing behavior. This determines the access and standardization in treatment of hypertensive patients. However, availability of generic antihypertensives as part of the formulary, knowledge of the pharmacist and physician communication with the pharmacist had the least influence on their prescribing behavior.

The study agreed with an earlier study by Abdulameer et al, 2012 , who found that physicians adhered to standard treatment guidelines. This therefore means that inclusion of generic antihypertensives as part of the guidelines would impact their prescribing because of their need for compliance. Similarly, the study agreed with previous studies by Saravdekar, et al 2019; Yilam et al, 2020, who found that availing cost effective generic medication as part of the formaulary through policy formulation would improve physician prescribing. This may be attributed to the need to ensure standardization in the plan of care in management of hypertension and to improve the outcomes.

5.3.6 Influence of Pharmaceutical factors

The results of the study revealed that some of the respondents agreed that reputation and drug related information from pharmaceutical companies had an effect towards their prescribing behavior. This indicated a positive relationship between pharmaceutical factors and prescribing. This findings was supported by previous studies that indicated that pharmaceutical factors had an impact towards generic prescribing by physicians(Davari et al., 2018).

There was a weak positive correlation between pharmaceutical factors and prescribing behavior of anti-hypertensive drugs. The positive correlation coefficient results implied that pharmaceutical factors correlate positively with prescription behavior among physicians. However, with a p-value lower than the recommended level of significance, the influence of pharmaceutical factors can be significant in influencing the prescription behavior of anti-hypertensive drugs by physicians in Nairobi County. The findings illustrate those pharmaceutical factors such as the reputation and information from pharmaceutical companies had the highest influence on prescribing behavior. This determines the knowledge that would be instilled among physicians as well as their confidence in the generic medication. However, free samples, association with the pharmaceutical companies and supplementary incentives had the least influence towards prescribing behavior.

The study agreed with a previous study by Fickweiler, Fickweiler, & Urbach, 2017 , who found that physician interactions with the pharmaceutical industry influenced their attitudes, prescribing and the drug formulary. The study also agrees with that by Lofti et al, 2016; Lieb et al, 2014; Oshikoya et al, 2011, that these interactions provided information to the physicians and would have an impact to their prescribing decisions. This therefore means that inclusion of generic antihypertensives as part of the guidelines would impact prescribing. Similarly, the study agreed with previous studies by Saravdekar, et al 2019; Yilam et al, 2020, who found that availing cost effective generic medication as part of the formulary through policy formulation would improve physician prescribing. This may be attributed to the need to ensure access, standardization and to improve outcomes.

5.4 Conclusion

The study utilized product, physician, patient, payer, environmental and pharmaceutical factors as independent variables. The conclusion was that that physician, product, and environmental factors had an insignificant positive relationship with physician prescribing behavior of antihypertensive medication. However, they positively influenced physician prescribing behavior. Also, there was no relationship between patient factors and prescribing behavior of anti-hypertensive medication by physicians in Nairobi County. Moreover, the study concluded that payer and pharmaceutical factors have a significant positive relationship with prescription behavior of antihypertensive medication among physicians.

In addition, another conclusion was that physician's prescribing of anti-hypertensive medication is important due to an increasing rate in antihypertensive intake in the country. Moreover, physician knowledge acquired from different levels of education and interactions with pharmaceutical companies can enhance their experience. In addition, this helps them by detect the quality antihypertensive drugs. This enhances their caution in prescribing of various antihypertensive medication and as result improving their experience.

Finally, efficacy, cost, quality, and side effects as product factors influence prescription behavior not only on anti-hypertensive medication but also other medication.

5.5 Recommendations

The study recommends that intake of hypertensive medication is high due to the prevalence of hypertension. Therefore, it's important to continuously examine the factors that may affect physician prescribing of the medication.

To the pharmaceutical companies, their interactions with physicians should be aimed at more outcomes and not just prescribing.

Patients comply with medication when they get better outcomes after consuming medication such as antihypertensives. Therefore, physicians should aim at improving outcomes and improving the quality of life as they prescribe medication. The study therefore recommends that physicians should do right for their patients by ensuring that they are not influenced by short term factors such as incentives rather the need to improve the clinical outcomes.

5.6 Areas of Further Study

Further studies should look at the extent of influence of product, physician, payer, environmental, pharmaceutical, and patient factors on prescribing behavior of anti-hypertensive medication in other counties since the rising prevalence of hypertension is comparable. Also, it's necessary to establish whether the study variables (product, physician, payer, environmental, pharmaceutical and patient factors) are the sole variables affecting physician prescribing behavior of anti-hypertensive medication.

5.7 Limitations of the Study

This study was limited to Nairobi County and did not involve other Counties in Kenya. In addition, the target population were physicians' mainly consultants, medical officers and interns and clinicians that provide clinical care especially in the primary healthcare setting.

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APPENDICES

Appendix 1: Letter of Introduction

Ole Sangale Rd, Madaraka Estate,
P.O Box 59857 00200, Nairobi, Kenya.
Cell: +254 703 414/6/7, Twitter: @SBSKenya
Email: info@sbs.ac.ke or visit www.sbs.strathmore.edu

Strathmore UNIVERSITY
BUSINESS SCHOOL

Thursday, September 2nd, 2021

To whom it may concern.

RE: FACILITATION OF RESEARCH – OMINA, CYNTHIA KANDA ADM. NO. MBA HCM 110610/18

This is to introduce Omina, Cynthia Kanda who is an MBA-HCM student at Strathmore University Business School. As part of our MBA in Healthcare Management Program, she is expected to do applied research and to undertake a project. This is in partial fulfilment of the requirements of the course. To this effect, she would like to request for appropriate data from your organization.

Cynthia is undertaking a research paper on "***Factors influencing prescribing decisions of physicians in Nairobi County: Results from a questionnaire-based survey.***" The information obtained from your organization shall be treated confidentially and shall be used for academic purposes only.

Our MBA in Healthcare Management course seeks to establish links with industry, and one of these ways is by directing our research to areas that would be of direct use to industry. We would be glad to share the findings with you after the research, and we trust that you will find them of great interest and of practical value to your organization.

We appreciate your support and we shall be willing to provide any further information if required.

Yours sincerely,

Caroline Tiara,
Manager – Graduate Programs.

Strathmore Business School is a Proud member of:
Association of African Business Schools AABS EFMD AACSB

Appendix 2: Questionnaire

You are kindly requested to take part in this study by filling in the questionnaire. Also, the information given should be appropriate and accurate enough to ease in making study conclusions. All information given will be treated with utmost confidentiality and is for academic purposes only. Please do not include your name.

Tick where appropriate (√)

SECTION A: BACKGROUND INFORMATION OF PHYSICIAN

1. Age

25–30 years [] 31 – 35 years [] 36 – 40 years [] above 40 years []

2. Education level

Undergraduate [] Postgraduate [] Fellow []

3. Years of service

Less than 1 year [] 1 – 3 years [] 4 – 6 years [] above 6 years []

4. Institutions of Practice

Public Only [] Private Only [] Faith Based [] Public and Private [] All of the above []

SECTION B: PRODUCT FACTORS

9. The following statements are descriptive of product related factors in relation to physician choice of generic antihypertensive drugs. Please indicate with a tick (√) your level of agreement with each statement in a scale of 1-5 where 1=strongly disagree (SD), 2=Disagree (D), 3=not sure (N), 4=agree (A) and 5=strongly agree (SA).

	Statement	SD	D	N	A	SA
1	The reputation of the drug in the market determines my prescribing behavior					
2	The efficacy of the drugs affects my prescribing decision					
3	I consider the expected side effects before making decisions on prescribing					
4	The patient's ability to remember these drugs in the hospital affects my prescribing decisions					

5	I prescribe anti-hypertensive drug based on the drug awareness in the market					
6	I do think about the quality of generic drugs before prescribing to my patients					
7	I consider the cost of these medication before prescribing medication to the patient					

10. Product related factors are important in influencing the prescribing behavior of generic anti-hypertensive drugs

SD [] D [] N [] A [] SA []

SECTION C: PHYSICIAN FACTORS

15. The following statements are descriptive of physician factors in relation to their choice of generic antihypertensive drugs. Please indicate with a tick (√) your level of agreement with each statement in a scale of 1-5 where 1=strongly disagree (SD), 2=Disagree (D), 3=not sure (N), 4=agree (A) and 5=strongly agree (SA).

	Statement	SD	D	N	A	SA
1	I prescribe anti-hypertensive drug based on my knowledge of it					
2	My level of education affects my prescribing decisions of these medication					
3	I prescribe these medicines based on the patients' expectations					
4	My ability to recall these drugs affects my prescribing decisions					
5	The facility where I practice determines how I prescribe drugs for my patients					

16. Physician factors are important in influencing their prescribing behavior of generic anti-hypertensive drugs

SD [] D [] N [] A [] SA []

SECTION D: PATIENT FACTORS

7. The following statements are descriptive of patient related factors in relation to physician choice of generic antihypertensive drugs. Please indicate with a tick (√) your level of agreement with each statement in a scale of 1-5 where 1=strongly disagree (SD), 2=Disagree (D), 3=not sure (N), 4=agree (A) and 5=strongly agree (SA).

	Statement	SD	D	N	A	SA
1	The age of the patients affects my prescribing decisions					
2	I consider the gender of the patient when prescribing these medication					
3	I consider the patients comorbidities' before making my prescribing decisions					
4	The patient's ability to pay for medication affects my prescribing decisions					
5	I consider the patients awareness of their drug options before making prescribing decisions					
6	The patient's preference on a particular anti-hypertensive dug affect my prescribing behavior					
7	The feedback I receive from my patients at times determines my next prescription decision					
8	The patient's attitude towards medication affects my prescribing behavior					

8. Patient factors are important in influencing the prescribing behavior of generic anti-hypertensive drugs?

SD [] D [] N [] A [] SA []

SECTION E: PAYER FACTORS

11. The following statements are descriptive of payer factors in relation to physician choice of generic antihypertensive drugs. Please indicate with a tick (√) your level of

agreement with each statement in a scale of 1-5 where 1=strongly disagree (SD), 2=Disagree (D), 3=not sure (N), 4=agree (A) and 5=strongly agree (SA).

	Statement	SD	D	N	A	SA
1	The patient's mode of payments has a role to play in my prescribing decisions					
2	I consider the patients benefit packages before prescribing this medication					
3	The incentives provided by the third-party payer are a major factor to my prescribing decisions					

12. Payer related factors are important in influencing the prescribing behavior of generic anti-hypertensive drugs

SD [] D [] N [] A [] SA []

SECTION F: ENVIRONMENTAL FACTORS

5. The following statements are descriptive of environmental factors in relation to physician choice of generic antihypertensive drugs. Please indicate with a tick (√) your level of agreement with each statement in a scale of 1-5 where 1=strongly disagree (SD), 2=Disagree (D), 3=not sure (N), 4=agree (A) and 5=strongly agree (SA).

	Statement	SD	D	N	A	SA
1	I prescribe these drugs because they are easily available					
2	The standard treatment guidelines of the hospital that I practice affects my prescribing decision					
3	I prescribe these medicines because the hospital formulary guidelines require me to do so					
4	I consider the bidirectional communication with a pharmacist about drugs before prescribing any for my patients					

5	The expertise of the pharmacist providing information about the drug affects my prescribing decision					

6. Environmental factors are important in influencing the prescribing behavior of generic anti-hypertensive drugs

SD [] D [] N [] A [] SA []

SECTION G: PHARMACEUTICAL FACTORS

13. The following statements are descriptive of pharmaceutical related factors in relation to physician choice of generic antihypertensive drugs. Please indicate with a tick (√) your level of agreement with each statement in a scale of 1-5 where 1=strongly disagree (SD), 2=Disagree (D), 3=not sure (N), 4=agree (A) and 5=strongly agree (SA).

	Statement	SD	D	N	A	SA
1	The reputation of the drug manufacturer affects my prescribing behavior					
2	The free medical samples that I have utilized affect my prescribing decisions					
3	My level of association with the pharmaceutical companies determines my prescribing behavior					
4	I consider the information provided by medical representatives about new drugs before prescribing any for their patients					
5	I consider prescribing drugs from companies that offer supplementary valuable incentives					

14. Pharmaceutical related factors are important in influencing the prescribing behavior of generic anti-hypertensive drugs

SD [] D [] N [] A [] SA []

SECTION H: PRESCRIPTION BEHAVIOR OF PHYSICIANS IN REGARD TO GENERIC ANTI-HYPERTENSIVE DRUGS.

17. The following statements are descriptive of prescription behavior of physicians in regard to generic anti-hypertensive drugs. Please indicate with a tick (√) your level of agreement with each statement in a scale of 1-5 where 1=strongly disagree (SD), 2=Disagree (D), 3=not sure (N), 4=agree (A) and 5=strongly agree (SA).

	Statement	SD	D	N	A	SA
1	I also identify individual issues such as patient's drug preference, comorbidities, gender, affordability during prescribing decision making					
2	I consider cost of these drugs at the time of my prescribing decision					
3	Different forms of marketing by pharmaceutical companies may persuade how I prescribe drugs for patients					
4	I take into account drug issues such as name and origin, efficacy, side effects and their memorability during prescribing decision					
5	Availability of medication, hospital formulary and standard treatment guidelines of where I practice affects how I prescribe medication					
6	I prescribe medication based on my familiarity with it, previous outcomes, and patient's expectations.					

18. I do prescribe generic drugs more often than branded drugs.

SD [] D [] N [] A [] SA [ ]

Appendix 3: Consent Form

Study Title: RELATIVE INFLUENCE OF FACTORS AFFECTING PHYSICIAN PRESCRIBING DECISIONS IN NAIROBI COUNTY

Foreword: to you study

Participant Investigator: Cynthia Omina Kanda (Master of Business Administration in Healthcare Management) STRATHMORE BUSINESS SCHOOL, STRATHMORE UNIVERSITY.

Contact Telephone Number(s): 0723027183 Email: cindyomina@yahoo.com

Purpose of study: The study aims to determine the extent to which the product, physician, patients, payers, environmental and pharmaceutical related factors influence the prescribing of generic antihypertensive medication among physicians practicing in Nairobi County?

Eligibility to take part in this study: Participants have been selected from physicians who are in active clinical practice.

How to Participate: You shall be sent a google link through which you shall be required to give responses. Your opinion to some questions which will be asked regarding the factors that affect physician prescribing decisions taking approximately 20mins.

Right to refusal or withdrawal: Taking part in this study is voluntary; you may opt not to participate, and you are free to refuse to participate in this study You may also withdraw from the study at any time even after signing this form without victimization.

Confidentiality and privacy: Your participation in this research shall be confidential by identifying you in the responses by a unique number. Please do not refer to any patient as you give your responses. The study report that will be used in the thesis shall not use your name. All research records will be stored securely on a computer that shall be sufficiently encrypted and password protected. The people who are closely concerned with this study, my supervisor and examiners will have access to your information. In addition, the students and faculty at Strathmore Business School shall have access to this information. All your information will be kept confidential.

Risks and benefits: There are no risks associated with this study and neither are their financial benefits to you for taking part in the study. The findings of this study shall be

used to guide policy and development of standard treatment guidelines to improve generic drug prescribing.

For further clarifications or questions on this study, please contact me.

Investigator: Cynthia Omina Kanda (Mobile: 0723027183) Email cindyomina@yahoo.com OR

My supervisor: Dr. Ben Ngoye (Mobile: +254 (0) 715 395 882: Email: BNgoye@strathmore.edu OR **Enquiries to:** The Secretary- Strathmore University Institutional Ethics Review Board, P.O BOX 59857-00200, NAIROBI; Email: ethicsreview@strathmore.edu; Tel No: + 254 703 034 375

Your signature indicates that this research study has been explained to you, that you've been given the opportunity to ask questions, and that you agree to take part in this study.

Name……. Signature…..... Date: .....

For Official Use: Name……. Signature……. Date: ……

(Of Research Personnel)

Appendix 4: Timeline of Activities

Draft Title of Research work: Relative influence of factors affecting physician prescribing decisions in Nairobi County

Progress Stage	**Stage Description**	**Proposed dates**
1	Scoping of the Research study	March 2021
2	Choice of Research Topic	March 2021
3	Research Problem clarification, Research objectives, Purpose, and Significance	April 2021
4	Literature review	May 2021
5	Research Methodology	July 2021
6	Completing and submitting the research Proposal	October 2021
7	Proposal Defense	January 2022
8	Data Collection	June 2022
9	Data analysis and Interpretation	March 2023
10	Research Report writing – first draft	June 2023
11	Final draft of research report	June 2023

12	Submission of Research for Examination	July 2023

Appendix 5: Summary of Literature Review

Serial Number	Study	Summary	Summary of findings	Gaps identified
1	Davari,M, Khorasani, E., & Tigabu, B. M. (2018). Factors Influencing Prescribing Decisions of Physicians: A Review. *Ethiopian Journal of Health Sciences*, *28*(6), 795–804. https://doi.org/10.4314/ejhs.v28i6.15	A Review of Electronic databases from 2000 to 2016 to identify the factors which Influence Physicians Prescribing Decisions of	Commonest factors identified were the personal attribute of physicians', treatment cost, pharmaceuticals influence and patients' preferences	The sample size was small thus posing a challenge to external validity. Included only articles published in English thus may introduce bias
2	Toverud, E. L., Hartmann, K., & Håkonsen, H. (2015, August 3). A Systematic Review of Physicians' and Pharmacists' Perspectives on Generic Drug	A Systematic Review of Physicians' and Pharmacists' Perspectives on Generic Drug Use	physicians and pharmacists were aware of the cost-saving nature of generic drugs and their importance in	The sample size was small thus posing a challenge to external validity. Included only articles published in English thus

	Use: What are the Global Challenges? *Applied Health Economics and Health Policy*, Vol. 13, pp. 35–45. https://doi.org/10.1007/s40258-014-0145-2		improving global access to drugs. Differences existed between developing and developed countries	may introduce bias
3	Cameron, Alexandra, Mantel-Teeuwisse, A. K., Leufkens, H. G. M., & Laing, R. O. (2012). Switching from originator brand medicines to generic equivalents in selected developing countries: How much could be saved? *Value in Health*, *15*(5), 664–673. https://doi.org/10.	A systematic review and critical appraisal of literature on stakeholder perceptions of generic drugs	More than 50% of the savings would be generated to generic medication was used.	Not considering the level of generic penetration, choice of medication, current volume data and price data in the inclusion criteria causing lack of generalizability of the results

	1016/j.jval.2012.04.004			
4	Hassali, M. A., Wong, Z. Y., Alrasheedy, A. A., Saleem, F., Mohamad Yahaya, A. H., & Aljadhey, H. (2014, September 1). Perspectives of physicians practicing in low and middle income countries towards generic medicines: A narrative review. *Health Policy*, Vol. 117, pp. 297–310. https://doi.org/10.1016/j.healthpol.2014.07.014	Systematic review to understand the knowledge, attitudes and perceptions of physicians towards generic medicines	Physicians from LMICs had mixed views on generic medication while those from high income countries had positive views. Cost of generic medication is considered by physicians when prescribing.	The small sample size of publications from low- and middle-income countries would limit generalizability of the findings
5	Dunne, S. S., & Dunne, C. P. (2015). What do people really think of generic	A systematic literature review of articles to understand	Improved opinions regarding generic medication	Inclusion of publications which involved recruitment bias raising concerns

	medicines? A systematic review and critical appraisal of literature on stakeholder perceptions of generic drugs. *BMC Medicine*, *13*(1), 173. https://doi.org/10.1186/s12916-015-0415-3	the perspectives of stakeholders towards generic medication	Lower cost of generic medication as a determinant to their prescribing decisions.	about validity of the findings
6	Patel, M. R., Shah, K. S., & Shallcross, M. L. (2015). A qualitative study of physician perspectives of cost-related communication and patients' financial burden with managing chronic disease. *BMC Health Services Research*, *15*(1). https://doi.org/10.1186/s12913-	Qualitative study to describe the experiences of physicians with patients' financial burden when managing chronic diseases	Physicians are aware of the financial burden of patients. They do discuss them and come up with individualized strategies to address the challenges. The commonest way is use of generic medication	Inclusion of resident physicians from an academic setting thus the findings may not be generalized

	015-1189-1			
7	Toklu, H. Z., Dülger, G. A., Hidiroglu, S., Akici, A., Yetim, A., Gannemoglu, H. M., & Günes, H. (2012). Knowledge and attitudes of the pharmacists, prescribers and patients towards generic drug use in Istanbul-Turkey. *Pharmacy Practice (Internet)*, *10*(4), 199–206. https://doi.org/10.4321/s1886-36552012000400004	Quantitative study to understand the Knowledge and attitudes of the pharmacists, prescribers, and patients towards generic drug use	31%, 32 % and 24% of the pharmacists, prescribers, and patients respectively, expressed that they believed that the generic and original drugs were similar. 92%, 83%, 82% of prescribers, patients, pharmacists considered cost as the most important factor considered in generic substitution	Generalizability of the findings since the sample size was small and was conducted in an upper middle-income country
8	Dunne, S. S., Shannon, B., Cullen, W., & Dunne, C. P.	Qualitative study to assess of	generic medication was effective	Findings not generalizable since it included

	(2014). Beliefs, perceptions and behaviours of GPs towards generic medicines. *Family Practice*, *31*(4), 467–474. https://doi.org/10.1093/fampra/cmu024	perceptions of general practitioners in Ireland towards medication	and majority of them prescribed them mainly due to their cost effectiveness	participants with a university affiliation
9	Hart, J., Salman, H., Bergman, M., Neuman, V., Rudniki, C., Gilenberg, D., … Djaldetti, M. (1997). Do Drug Costs Affect Physicians' prescription decisions? *Journal of Internal Medicine*, *241*(5), 415–420. Https://doi.org/10.1046/j.1365-2796.1997.137143000.x	Simulation protocol for treatment of patients with urinary tract infection to study the effect of cost of pharmaceuticals on physicians' prescribing decisions	knowledge of the cost of drugs costs affects the prescribing decisions among physicians in the wards, while family physicians preferred less costly drugs even before they were told about the costs.	small sample size and tested medication for an acute illness therefore the findings may not be generalized.

10	Ryan, M., Yule, B., Bond, C., & Taylor, R. J. (1996). Do physicians' perceptions of drug costs influence their prescribing? *PharmacoEconomics*, *9*(4), 321–331. https://doi.org/10.2165/00019053-199609040-00005	Quantitative study to understand the influence of perceived costs on general practitioners' prescriptions for penicillin and ulcer, and analgesics	Most general practitioners considered cost when prescribing but had inaccurate knowledge on the same	Lack of generalizability to other settings and chronic illnesses as was done in a developed country and concentrated on acute conditions
11	Mohanty, B. K., Aswini, M., Hasamnis, A. A., Patil, S. S., Murty, K. S. N., & Jena, S. K. (2010). Prescription pattern in the Department of Medicine of a Tertiary Care Hospital in South	Cross sectional study to find the prescribing behavior of physicians by analyzing past prescriptions	Few generic prescriptions due to concerns about the efficacy and bioavailability, availability of formulations and price difference.	Limited generalization due to non-categorization of prescribers to cadres, limited patients, and short study period

	India. *Journal of Clinical and Diagnostic Research*, *4*(1), 2047–2051. Retrieved from https://www.researchgate.net/publication/289543125			
12	Colgan, S., Faasse, K., Martin, L. R., Stephens, M. H., Grey, A., & Petrie, K. J. (2015, December 1). Perceptions of generic medication in the general population, doctors and pharmacists: A systematic review. *BMJ Open*, Vol. 5, p. e008915. https://doi.org/10.1136/bmjopen-2015-008915	Quantitative study to understand the attitudes of lay people, doctors, and pharmacists towards generic drugs	Lay people, doctors and pharmacists all held negative perception towards generic drugs as are less effective, unsafe safe, poor quality and more likely cause adverse effects.	Risk of bias as only included studies published in English and through four databases

13	Kasliwal, N. (2013). A Study of Psychosocial Factors on Doctors Prescribing Behaviour - An Empirical Study in India. *IOSR Journal of Business and Management*, *13*(2), 05–10. https://doi.org/10.9790/487x-1320510	Quantitative study to identify the impact of psychosocial factors on different age groups and area of specialty of doctors	Varying impact of psychosocial factors across different demographic characteristics on prescribing decisions, with less impact on key opinion leaders	Limited generalizability as it included only 5 specialties and doctors practicing in urban areas
14	Nair, H., Manchanda, P., & Bhatia, T. (2006). Asymmetric peer effects in physician prescription behavior: The role of opinion leaders. *Research Papers*, (1970), 1–32. Retrieved from https://www.rese	A review of primary and secondary data to identify doctors whose actions affect the nominating physician's approach to the treatment	Opinion leaders significantly affect physician behavior	selecting a non-robust network of physicians thus can't be generalized

	archgate.net/publication/4893875_Asymmetric_Peer_Effects_in_Physician_Prescription_Behavior_The_Role_of_Opinion_Leaders	of chronic diseases		
15	Kobayashi, E., Abe, C., & Satoh, N. (2019). Patients' perspectives on generic substitution among statin users in Japan. *Journal of Public Health (Germany)*, *27*(1), 11–19. https://doi.org/10.1007/s10389-018-0918-4	Cross sectional questionnaire survey to identify differences in characteristics among statin users, their views on generic medication and factors affecting their use	Patients had concerns switching from their existing regimen to generic despite the affordability. Demographic characteristics had no effect on their use of generic medication	Lack of generalizability due to small sample size and choice of the study site
16	Hamada, Y., Uchida, M., Arai, S., Yamazaki, K., Takeda, M., Arai, K., … Ishii, I. (2020). Analysis	Retrospective single-center study finding the effect of therapeutic	30% of the patients switched medication due to the efficacy,	No inclusion of handwritten prescriptions which is common practice in our setting thus may

	of patients' request to switch from a generic drug to the original drug in external prescriptions. *Journal of Pharmaceutical Health Care and Sciences*, *6*(1), 1–9. https://doi.org/10.1186/s40780-020-00180-w	category and dosage form to the frequency and reasons for switch of branded to generic drugs	safety, and comfort of the drug. Also, there was a relationship between switching and therapeutic categories and dosage forms.	limit transferability of findings to our set up
17	Kobayashi, E., Karigome, H., Sakurada, T., Satoh, N., & Ueda, S. (2011). Patients' attitudes towards generic drug substitution in Japan. *Health Policy*, *99*(1), 60–65. https://doi.org/10.1016/J.HEALTHPOL.2010.07.006	Quantitative study to assess the understanding and attitude of patients towards generic drug substitutions and evaluate the factors associated with the experience and	68.4% of the respondents knew the definition of generic drugs, 86% and 71% knew about its affordability and 71.1% efficacy. There was a knowledge gap in the availability	The main limitation in this study is the setting therefore making it lack transferability to developing countries

		willingness of generic substitution	and accessibility	
18	Kjoenniksen, I., Lindbaek, M., & Granas, A. G. (2006). Patients' attitudes towards and experiences of generic drug substitution in Norway. *Pharmacy World and Science 2006 28:5*, *28*(5), 284–289. https://doi.org/10.1007/S11096-006-9043-5	Retrospective review of prescriptions to assess patients' attitudes and experiences towards generic substitution	Patients who were more likely to switch medication were informed by their physician, also economic incentives played a role towards their decision making.	This study included a restricted number of patients thus the findings may not be generalizable
19	Niebling, W., Gill, L., Helkkula, A., Himmel, W., Simmenroth-Nayda, A., Niebling, W., … Hummers-Pradier, E. (2005). What do primary care patients think	Randomized controlled trial of patients their attitude towards generic drugs with focus on their satisfaction with the	Two thirds of patients differentiated branded and generic medication, a third of them expressed dissatisfaction in the	Sampling bias underrepresented doctors with low interest in pharmacotherapy and those with low rates of generic prescribing.

	about generic drugs? Cite this paper Related papers How do cust omers and pharmacist s experience generic subst it ut ion What do primary care patients think about generic drugs? *Int. Journal of Clinical Pharmacology and Therapeutics*, *43*(10), 472–479.	information provided by the general practitioner	information provided.	
20	Reichert, S., Simon, T., & Halm, E. A. (2000). Physicians' attitudes about prescribing and knowledge of the costs of common medications. *Archives of Internal Medicine*,	Survey to measure the attitudes of physicians on prescribing and knowledge of drug as well as the differences	cost of drugs was an important consideration in the prescribing decision to an extent of compromising efficacy to make ensure affordability.	Inclusion of internal medicine physicians at a single academic medical center poses a challenge with generalization of the findings to other settings or disciplines

	160(18), 2799–2803. https://doi.org/10.1001/archinte.160.18.2799		Majority had no idea of actual cost	
21	Rafferty, T., Wilson-Davis, K., & McGavock, H. (1997). How has fundholding in Northern Ireland affected prescribing patterns? A longitudinal study. *BMJ*, *315*(7101), 166–170. https://doi.org/10.1136/BMJ.315.7101.166	Data analysis to compare prescribing patterns before and after the introduction of fundholding	Cost and frequency of prescribing increased across all groups but at a lower rate among the fund holders	Fund holding is not applicable to many developing countries therefore this study may not be transferable
22	Roberts, S. J., Bateman, D. N., & Smith, J. M. (1997). Prescribing behaviour in general practice: the impact of	Retrospective study of prescriptions to assess the impact of an incentive scheme on the general	Low prescribing rate for branded drugs and those promoted by the scheme. Higher	The setting being a developed country thus its findings may not be transferable to a low- and middle-income country.

	promoting therapeutically equivalent cheaper medicines. *British Journal of General Practice*, *47*(414).	practitioners' prescribing behavior	prescribing rate for low cost-growth band of practices due to the cost saving nature of generic medication	
23	Abdulameer, S. A., Sahib, M. N., Aziz, N. A., Hassan, Y., AlRazzaq, H. A. A., & Ismail, O. (2012). Physician adherence to hypertension treatment guidelines and drug acquisition costs of antihypertensive drugs at the cardiac clinic: a pilot study. *Patient Preference and Adherence*, *6*, 101. https://doi.org/10.	cross-sectional study to determine the trend of prescribing trend, adherence to the guideline, and impact of drug expenditure on drug utilization	good adherence to guidelines resulting in reduced cost	The study didn't consider the blood pressure of all patients and the small sample size thus not giving a precise picture of the management of hypertensive patients.

	2147/PPA.S27223			
24	Moon, J. C., Godman, B., Petzold, M., Alvarez-Madrazo, S., Bennett, K., Bishop, I., … Malmström, R. E. (2014). Different initiatives across Europe to enhance losartan utilization post generics: impact and implications. *Frontiers in Pharmacology*, *0*(SEP), 219. https://doi.org/10.3389/FPHAR.2014.00219	Retrospective analysis of strategies used increase prescribing of the generic Losartan following its availability in the Europe market, change in policy and introduction of incentive	Utilization was more in Denmark and Sweden, while it fell in some countries with no attribution to specific demand side measures.	The limitation of this study is its setting thus the findings may not be transferable to developed countries.
25	Saravdekar, S., Shukla, V. K., Upadhya, O. P., Rai, M., & Giri, K. (2019). Implementation of principles of pharmacoeconom	Observational, and retrospective study to review the implementation of the	QPMP can help countries effectively deal with both the cost and quality of medication.	This study may not be transferable to the developing settings

	ics and pharmacovigilance to achieve optimal financial and therapeutic benefits through WHO - Essential medicine policy and adoption of NLEM-Based hospital formulary policy. *Journal of Family Medicine and Primary Care*, *8*(6), 1987. https://doi.org/10.4103/JFMPC.JFMPC_287_19	principles of **P**harmacoeconomics and Pharmacovigilance in the procurement, selection, and use of Essential medication		
26	Yilma, Z., & Liben, M. (2020). Assessment of Drug Prescription Pattern in Mekelle General Hospital, Mekelle, Ethiopia, Using World Health Organization	Descriptive cross-sectional, retrospective hospital-based study to assess to the prescription pattern, using WHO	A lower prescription rate of generic medication as noted	The small sample size therefore affecting the generalizability of the findings.

	Prescribing Indicators. *BioMed Research International*, *2020*. https://doi.org/10.1155/2020/3809157	prescribing indication		
27	Fickweiler, F., Fickweiler, W., & Urbach, E. (2017). Interactions between physicians and the pharmaceutical industry generally and sales representatives specifically and their association with physicians' attitudes and prescribing habits: a systematic review. *BMJ Open*, *7*(9), e016408.	systematic review of articles to explore the interactions between physicians and the pharmaceutical industry and their impact on physicians' attitude and prescribing habits	The interactions between the pharmaceutical industry and their sales representative influenced physicians' attitudes and their prescribing habits and affected the increased the formulary.	The limitation was inclusion of studies that didn't provide evidence for the significance of their findings or had varying study designs and outcome making it hard to do a meta-analysis

	https://doi.org/10.1136/BMJOPEN-2017-016408			
28	Lotfi, T., Morsi, R. Z., Rajabbik, M. H., Alkhaled, L., Kahale, L., Nass, H., … Akl, E. A. (2016). Knowledge, beliefs and attitudes of physicians in low and middle-income countries regarding interacting with pharmaceutical companies: a systematic review. *BMC Health Services Research 2016 16:1*, *16*(1), 1–11. https://doi.org/10.1186/S12913-016-1299-4	systematic review of to understand the knowledge, beliefs and attitudes of physicians in low and middle-income countries regarding interactions with pharmaceutical companies.	the highest perceived benefit of the interaction was information and rewards as opposed to an effect of their behavior	None of the existing primary studies assesses knowledge, use of non-validated questionnaires as well as doing the study in varied sociocultural backgrounds therefore affecting validity and generalizability of the findings.
29	Lieb, K., & Scheurich, A. (2014).	Quantitative study to	Only 42% believed that	The low response rate limiting the

	Contact between Doctors and the Pharmaceutical Industry, Their Perceptions, and the Effects on Prescribing Habits. *PLOS ONE*, *9*(10), e110130. https://doi.org/10.1371/JOURNAL.PONE.0110130	determine the extent to which contacts with pharmaceutical sales representatives and the Bavarian Association of Statutory Health Insurance Physicians Influenced their prescribing habits	these interactions affected their prescribing habits, and this was reflected by higher total prescriptions and doses, more so generic medication.	representative nature of the responses
30	Oshikoya, K., Oreagba, I., & Adeyemi, O. (2011). Sources of drug information and their influence on the prescribing behaviour of doctors in a teaching hospital in Ibadan, Nigeria. *Pan*	Quantitative study of doctors aimed at determining the sources of drug information and assess the impact on their prescribing behavior.	Over half of the respondents, reported that sales representatives were an accurate and reliable source, and this has an effect on their	main limitation of this study is the self-report which may be an underestimation of the effect of pharmaceutical promotion on the prescribing behavior of doctors as well as bias the findings

	African Medical Journal, *9*(1). https://doi.org/10.4314/pamj.v9i1.71188		prescribing behaviors	
31	Klemenc-Ketis, Z., & Kersnik, J. (2013). The assessment of pharmaceutical sales representatives by family physicians—does it affect the prescribing index? *Family Practice*, *30*(3), 320–324. https://doi.org/10.1093/FAMPRA/CMS078	Cross-sectional observational study to determine if there was an association between pharmaceutical sales representatives by family physicians and the prescribing index	Interactions of sales representatives by family physicians was not significantly associated with a prescribing	Self-reporting of data by family physicians regarding the prescribing index may lead to selection bias and biased results

Appendix 6: Proposed Budget

ITEM	**COST IN KES**
STATIONERY	30,000
TYPING AND INTERNET	10,000
NACOSTI APPROVAL	1,000
PRINTING AND BINDING	30,000
PROOF READING AND EDITING	5,000
MISCELLANEOUS	15,000
DATA ANALYSIS	60,000
TOTAL	**151,000**

Appendix 7: Ethics Review Committee Letter

Strathmore UNIVERSITY

24th May 2022

Dr Kanda Cynthia,
omina.kanda@strathmore.edu

Dear Dr Kanda,

RE: Relative Influence of Factors Affecting Physician Prescribing Decisions

This is to inform you that SU-IERC has reviewed and **approved** your above **SU PHD** research proposal. Your application reference number is **SU-IERC1299/22.** The approval period is **24th May 2022 to 23rd May 2023.**

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-IERC.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-IERC within 48 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-IERC within 48 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to SU-IERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) https://research-portal.nacosti.go.ke/ and obtain other clearances needed.

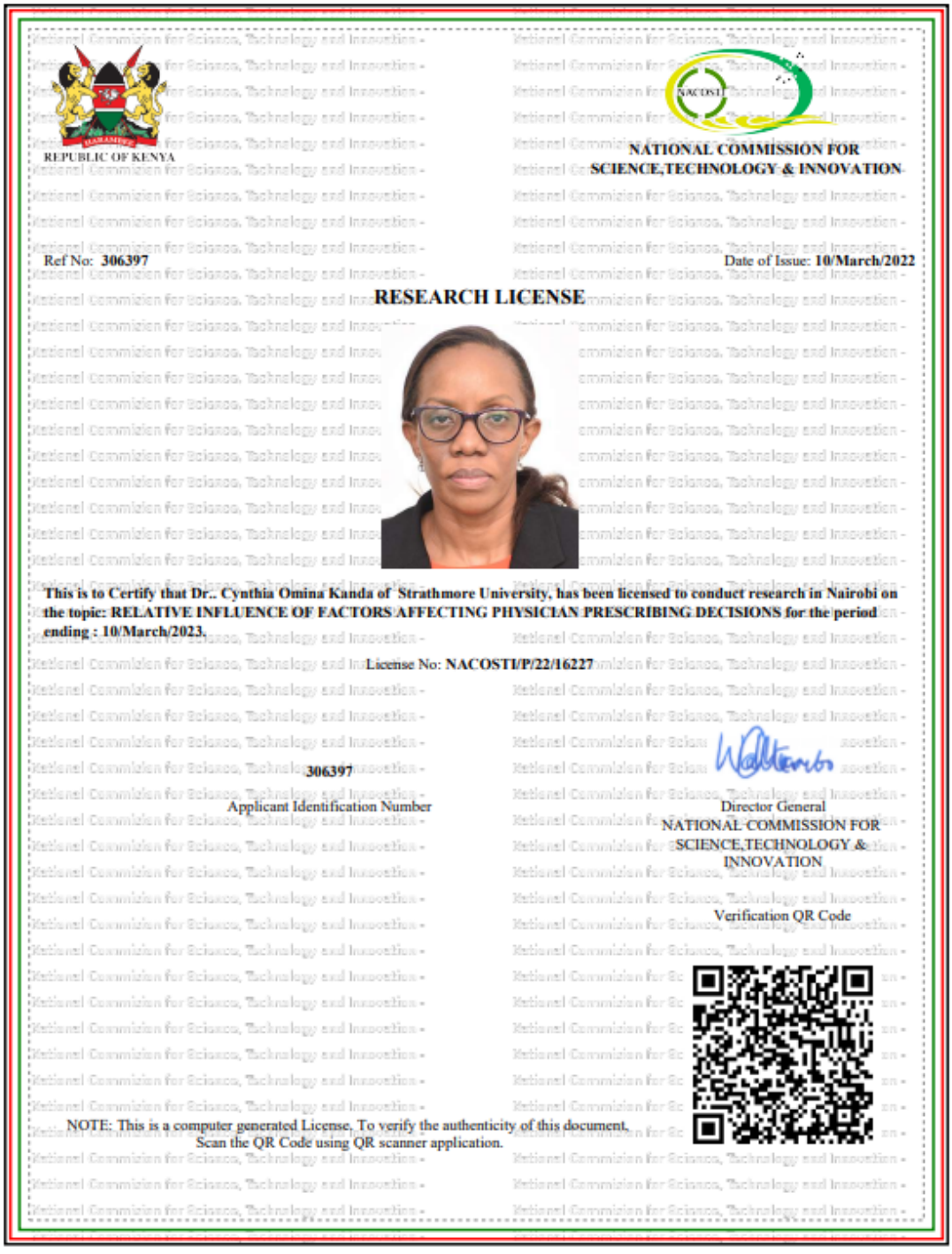
Yours sincerely,

for: **Dr Ben Ngoye,**
Secretary; SU-IERC

Cc: Prof Fred Were,
Chairperson; SU-IERC

STRATHMORE UNIVERSITY INSTITUTIONAL ETHICS REVIEW COMMITTEE (SU-IERC)
24 May 2022
Email:ethicsreview@strathmore.edu
P.O BOX 59857-00200
NAIROBI-KENYA

Appendix 8: Nacosti Research License



REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **306397**

Date of Issue: **10/March/2022**

RESEARCH LICENSE

This is to Certify that Dr.. Cynthia Omina Kanda of Strathmore University, has been licensed to conduct research in Nairobi on the topic: RELATIVE INFLUENCE OF FACTORS AFFECTING PHYSICIAN PRESCRIBING DECISIONS for the period ending : 10/March/2023.

License No: **NACOSTI/P/22/16227**

306397

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013

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