Factors Influencing the Perception of Physicians towards Generic Medicines Prescription and Practices: The Case of Private Hospitals in Addis Ababa

A Thesis Submitted to Addis Ababa University College of Business and Economics School of Graduate Studies MBA Program in Partial Fulfillment of the Requirements for the Award of Master Business Administration in Management.

By: Kassaye Adane

Advisor: Workneh Kassa (PhD)

October, 2020

Addis Ababa, Ethiopia

ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

POST GRADUATE PROGRAM OF BUSINESS ADMINISTRATION

This is to certify that this research entitled as “Factors Influencing the Perception of Physicians towards Generic Medicines Prescription and Practices: The case of Private Hospitals in Addis Ababa”. It is submitted to College of Business and Economics at Addis Ababa University in partial fulfillments of the requirements for the degree of Master of Business Administration in Management.

Approved by Board of Examiners

_____	_____	_____
Advisor	Signature	Date
_____	_____	_____
Internal Examiner	Signature	Date
_____	_____	_____
External Examiner	Signature	Date

DECLARATION

I, the undersigned, declare that this study entitled as "Factors Influencing the Perception of Physicians towards Generic Medicines Prescription and Practices: The case of Private Hospitals in Addis Ababa". This study has not been submitted for a degree in any other university. It is submitted to College of Business and Economics at Addis Ababa University in partial fulfillment of the requirements for the degree of Master of Business Administration. All sources of materials used for the research have been duly acknowledged, cited and referenced.

Name: Kassaye Adane Wolie

Signature: ----------

Date of submission: ----------

LETTER OF CERTIFICATION

This is to certify that Kassaye Adane has carried out his study under my supervision on the topic of: “Factors Influencing the Perception of Physicians towards Generic Medicines Prescription and Practices: The case of Private Hospitals in Addis Ababa”. This work is suitable for submission in partial fulfillment of the requirement for the award of Degree Master of Business Administration in Management.

Workneh Kassa (PhD)

Signature_____

Date_____

ACKNOWLEDGEMENT

First of all, thanks to GOD, the Lord of survival and the most Merciful. Secondly, a sincere gratitude and appreciation goes to my advisor, Dr. Workneh Kassa for his valuable guidance and in depth understanding that he extended to me during the entire work of this paper. I am thankful to all private hospitals physicians in filling the questionnaires and providing necessary information for the study with sacrificing their precious time. Finally, I would extend my sense of gratitude to my family and everyone who had directly or indirectly have lent their helping hand in this venture. I truly appreciate their assistance, encouragement, advices and suggestions on every stage in completing this study.

TABLE OF CONTENTS

Content Page

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

ADR- Adverse drug reaction

ANOVA - Variation of analysis

EFDA- Ethiopian Food and Medicine Administration

EPSA- Ethiopian Pharmaceutical Supply Agency

FDA -United States Food and Medicine Administration

FMOH- Federal Ministry of Health

GMP- Good Manufacturing Practices

GP-General Practitioners

HBM-Health Belief Model

OOP – Out of pocket

PV- Pharmacovigilance

SIAPS- Systems for Improving Access to Pharmaceuticals and Service

SPSS - Statistical Package for Social Sciences

WHO -World Health Organization

Abstract

Generic medicines have the same quality, safety, and efficacy as their counterpart brand medicines. Generic medicines are produced by multiple manufacturers hence, are usually cheaper and be cost effective than innovator brand. This research aimed to examine physicians' perception towards generic medications and factors influencing their practice in prescribing generic medicines among private hospitals in Addis Ababa. Cross-sectional study was conducted with physicians working in private hospitals of Addis Ababa. Data were collected using self-administered structured questionnaires measuring physicians' perception towards generic medicines and their prescription using a Likert scale of 1–5. A total of 195(95%) of physicians responds from 205 physicians. Data were then entered into SPSS version 23 for analysis. Both descriptive and inferential statistics were used to analyze the data and the result was interpreted. Most of the physicians had good knowledge about generic medicines .However; there were gaps on the efficacy, quality and safety of generics medicines. A significant proportion of physicians do not have positive perceptions of generic medicine. However, More than three fourth of physicians believed generic medicines contributed to cost-effective management of disease and could improve access to medications. Whereas significant numbers of physicians believed generic medicines were only meant for poor, and have concerns on their efficacy quality and safety. From regression result, except cost all independent variables have strong positive and statistically significant relationship between these independent variables with both dependent variables. The most influential factors affecting the physicians' generic prescription practice were knowledge about generic medicine and safety, quality and efficacy of the generic medicines. Finally the study conclude that majority of the physicians not have positive perception and had concerns about safety, quality and the efficacy of generic medicines. There is a low generic medicine prescription rate and physicians preferred to prescribe originator drug product. It requested the support of stakeholders to improve the utilization of generic medicines and more scientific evidence about the safety and efficacy of generic medicines will improve generic prescribing.

Key words: generic medicine, perception, physician, prescription, medicine prescription, Generic medicine prescription, Generic medicine and perception.

CHAPTER ONE

INTRODUCTION

1.1 Background

World Health Organization (WHO), defined generic medicine as a pharmaceutical product that is usually intended to be interchangeable with an innovator product is manufactured without a license from the innovator company and is marketed after the expiry date of the patent or other exclusive rights (WHIO, 2004). A generic form of a medicine must contain the same active substance(s) as the proprietary or reference medicine, must be used at the same dose to treat the same disease(s) as the reference medicine and must be demonstrated as being bioequivalent to the originator or reference medicine. However, the appearance and packaging may differ as well as any non-active (that is: excipient) ingredients. The United States Food and Medicine Administration (FDA) examines generic medicine formulation and if it finds them to be suitable, will approve them as therapeutic equivalent to brand-name medicines in terms of safety, strength, and quality (FDA, 2001). Generic medications have been in use for many years and are generally less expensive than their proprietary or brand name counterparts (WHO, 1997).

Developments in medical sciences have contributed a lot to the prophylaxis and cure of diseases. However, a huge population across the globe still has limited access to life-saving medicines. According to the WHO, one-third of the world's population, i.e. developing countries such as in Africa and Asia, have no access to essential medicines. One of the main reasons is high cost of essential medicines and poor consumers' purchasing power and this was a major challenge to the treatment of chronic health conditions (WHO, 2008). In many countries, a rise in health care expenditure has been noticed. A total of 13–32% of a month household expenditure was contributed to health care in 51 low- and middle-income countries. It is evident that the medicines contribute significantly to cost burden (FMOH/WHO, 2007). However, over the three last decades the generic medicines have provided an alternative to cope with the escalating cost of therapy. Thus, this helps the health care and regulatory bodies to make effective use of financial resources allocated for purchasing of medicines (FMOH/WHO, 2005).

The benefits due to low price and effective utilization of financial resources have motivated the health regulating authorities to promote the use of generic medicines. One such initiative was

also taken by the Ethiopian government, which has resulted in ease of access to essential medicines and cost saving in some of the clinical settings. In the delivery of health care services to Ethiopia, the public sector has a major contribution (FMOH/WHO, 2005). However, long waiting times and immediate access to the health care services have pushed consumers to approach the private hospitals, clinics and community pharmacies. Unlike the public health care facilities, in private health care setups it is hard to ensure the implementation of the generic policies by the health regulatory authorities (FMOH/WHO, 2007). In this situation the prescriber is free to prescribe any medicines (generic or branded) and consumers can request whatever they want. Hence, the success of any generic medicine policy will be dependent on prescriber will and consumer choice (Mohamed et al., 2010).

There are many factors that can influence perception, choosing and prescribing of generic medications. Factors were grouped under three factors as technical, patient and social factors. Technical factors are factors related to physicians and medicines. Patient factors are patient-related factors. Social factors are factors such as health care systems and the cultural structure of the society (Denig, 1994).

Technical factor is the major factor affecting the physicians' perception and choice of medicines followed by patient factor and social factor. Among technical factor the most emphasized factors are the efficacy, quality, costs and safety of the medicine and physicians' knowledge about medicine. From the patient factor the main factors are socio-economic status and demands of the patient. Among the social factors medicine availability is the most emphasized factor (Spurling et al., 2010).

Differences in Physicians' Perceptions regarding generic medicines have resulted in very different prescription rates for generic medicines across countries. Few earlier Ethiopian studies have shown lack of physicians' willingness to prescribe generic medicines. The majority have concerns towards the quality, safety and efficacy of generic medicines (William et al., 2011). However, information regarding the knowledge, perception and attitude of Ethiopian physicians towards generic medicines is lacking. This needs to be addressed in order to develop policies to overcome potential misinformation and misconceptions concerning generic medicines. Therefore, the current study aims to evaluate physicians' understanding of the concept of generic

medicines and perceptions of generic medicines as well as assess physicians prescribing of generic medicines in private health care facilities Addis Ababa, Ethiopia.

1.2 Statement of the Problem

Medication serves as a therapeutic intervention designed to manage both acute and chronic health conditions. A health care demands access to affordable medicines of assured quality, safety and efficacy to improve the health and quality of life of patients who suffer from multiple health conditions. About 30% of the world's population lacks regular access to essential medicines; in the poorest parts of Africa and Asia this figure rises to over 50% (Cameron et al., 2011). The most crucial element which restricts access to medicines is medicine pricing and affordable price is one of the measures to counteract the global medicine gap. The issue of access and affordability is thus addressed by using generic medicines as a cost containment strategy globally (WHO/HAI, 2008).

The Ethiopian health system is severely underfinanced and highly dependent on out-of-pocket (OOP) payments by households. Fifty nine percent of outpatient and 88% of inpatient covered cost of health care through OOP payments and medicine costs constitute about half of the outpatient care expenditures and a large segment of the population purchase medicine from private medicine retail outlets (Tolla et al., 2016 and FMOH/WHO, 2005). According to a survey on price of medicine in Ethiopia, innovator brand products in the private pharmacies was generally 5.9 times as expensive as generic equivalents (FMOH/WHO, 2007). Thirty nine percent of the clients in the private sectors of Addis Ababa were not able to pay for the prescribed medicines and the most important predictors of community's ability to pay for the prescribed medicine is the price of the prescribed medicines (Mohammed et al., 2009).

Both in developed and developing countries, health insurance agencies, health authorities and governments have suffered from pharmaceutical expenditures that has risen rapidly especially in the last two decades (Weekes & Ramzan, 2010 and Godman et al., 2010). The use of generic medicines has increased significantly in recent years in all countries. Since generic medicines are available at a lower cost, substituting generic medicines for more expensive brand-name medicines will provide savings for the medicine-consuming population without reducing the quality (Haas et al., 2005). Study conducted in 17 developing countries reported an average of 9–

89% expenditure could be saved by each country in private sector purchases by switching from originator brands to lowest-priced generic medicines (Homedes & Ugalde, 2005).

Ethiopia has announced a long term policy and plan to support the growth manufacturing pharmaceutical industry which aimed at increasing its generic medicine coverage by its own domestic pharmaceutical industry, procure and distribute generic medicines at national level (Pharmaceutical Supply Agency) for public healthcare facilities and develop clinical practice guidelines to enforce a prescription should be using generic names of the medicine(s) to support generic medicines utilization. Unlike the public health care facilities, in private health care setups it is hard to ensure the implementation of the generic policies by the health regulatory authorities. In this situation the prescriber is free to prescribe any medicines (generic or branded) and consumers can request whatever they want. Hence, the success of any generic medicine policy will be dependent on the knowledge and perception of prescribing and dispensing healthcare professional as well as patients (SIAPS, 2016).

The practice of generic medicines prescribing, dispensing and substitution in developing countries has been controversial among healthcare professionals, particularly due to issues on quality, safety and efficacy. These controversies are as a result of inter-country differences in policies as well as individualized knowledge and perception of health professionals pertaining to generic medicines (Decollogny et al., 2011). There are many factors that can influence choosing, prescribing, of generic medications. Inaccurate or insufficient knowledge and negative perceptions of healthcare providers about generic medicines are the most challenging barriers and causes hesitation to the widespread adoption of generic medicines. Moreover, misinformation and prescribing habits of physicians to prescribe by brand name, generally ignoring medicine prices are challenging to the rising of pharmaceutical costs (Colgan, 2015). This is especially true for sub-Saharan African countries like Ethiopia where access to quality affordable medicines is a major challenge and the main sources of medicine expenditure is patients' OOP money (Cameron et al., 2011 & Tolla et al., 2016).

Although the importance of generic medicines on Ethiopian market is paramount in view of the limited financial resources for healthcare (Tolla et al., 2016), there are still lack studies regarding the perception of physicians towards generic medicines working in private healthcare facilities.

To the best of our knowledge, there is no study regarding physicians' perception and knowledge towards generic medicines in private healthcare facilities in Addis Ababa.

Studies on Physicians' perception towards generic medicines in private health facilities, Mekelle city, northeastern Ethiopia were conducted by Gebrekirstos et al. (2016) and Workneh et al. (2017) showed there were gap on knowledge and majority of physicians do have a negative perception of generic medicines. Both studies have provided inputs to develop polices and measures that can correct the perception of physicians towards generic medications and can serve as a preliminary study are helpful in understanding the perception of Physicians towards generic medicines use in Ethiopia. Nevertheless, there are limitations associated with those studies. First, the sample of the study included only among Physicians working in private health care facilities in the Mekelle city. Therefore, the results of those researches were representative of only a specific region and might not be applicable to physicians practicing in other cities and the entire physicians of the Ethiopia. The sample sizes of the studies were too small (49 and 50 respectively) to represent the knowledge, perceptions and practices of all the physicians regarding the prescription of generic medicines. Quantitative studies method requires a large sample size to describe and provide valid results. Based on this, there will be a need for further research with a larger sample size to ensure the development of valid results.

Gebresillassie et al. (2018) conducted quantitative cross-sectional survey investigating generic medicines perceptions of physicians in Gondar town reported a very low generic medicine prescription rate by majority of physicians. The study participants were representative of physicians working in various sectors including private and government hospitals, academicians as well as clinical researchers. This survey highlights potential problems that may need to be overcome in achieving acceptance of generic. Yet, the survey has some limitations that should be taken into account while extrapolating the results. The sample of the study included only the physicians of Gondar and utilizes a convenience sampling technique. Therefore, the results of this research were representative of only a specific city and might not be applicable to the entire regions and cities in Ethiopia.

Addressing issues on physicians' perception towards generic medicines remains to be the pivotal aspect in optimizing cost of therapy and in the bigger picture the medicines procurement cost for the country health budget. The present study is conducted to analyze the extent of the problem in

a different setting and with large sample size to previous studies. Therefore, this study aims to analyze the factors that influence: 1) perception of physicians towards generic medication prescription, 2) the pattern and practice of generic medicines prescription in private healthcare facilities, Addis Ababa, Ethiopia.

1.3 Research Questions

1. How physicians understand of the concept of generic medicines?
2. What are factors that influence the physicians' perception toward generic medications in private hospital of Addis Ababa?
3. What are factors that influence physicians' practice of prescription of generic medications in private in private hospital of Addis Ababa?

1.4 Research Objectives

1.4.1 General Objective:

- To analyze physicians' perception and practices in private healthcare facilities about generic medications.

1.4.2 Specific objective:

1. To analyze physicians' understanding of the concept of generic medicines.
2. To analyze the factors that influence physicians' perception toward generic medications in private hospitals of Addis Ababa.
3. To investigate factors that influence physicians' practices in prescribing generic medicines in private hospitals, Addis Ababa.

1.5 Significance of the Study

The use of generic medicines is a policy option that will allow for access to affordable medicines. The fundamental significance of the study is seen in the fact that, there is hardly any research work available locally on the perception of physicians on generic medicines. As such, the finding of the study will serve as a contribution to fill the knowledge gap. The knowledge gained from this study can also be used to address negative perceptions of generic medicines. If

physicians have a positive perception of generic medicines, they may be prompted to prescribe more generic medicines.

Understanding physicians' perceptions about the quality and efficacy of generic medicines may help identify potential barriers to greater generic medication use. Finally, this study will provide policy makers and insurers with relevant information that will aid in their decision-making process. The information gained from this study can serve as a strategic tool in the area of generic cost savings.

1.6 Scope of the Study

The research study tries to limit in Addis Ababa private hospitals. The study was carried out to evaluate physicians' understanding of the concept of generic medicines. It emphasized to assess the perception of physicians toward generic medications and to investigate factors that influence physicians in prescribing generic medicines. The study has covered those physicians working in private hospitals of Addis Ababa at normal working hours of week days. The study covers only technical factors cost of generic medicines and knowledge about generic medicines among factors that have influences physicians' perception and practice of generic medicines.

1.7 Limitation of the Study

Physicians from all public hospitals in Ethiopia and private health care facilities outside of Addis Ababa were not included. This is due to the time constraint, budget and geographical limitation to cover all hospitals in the country. This research work generalizes the result based on the sample employees at private hospitals in Addis Ababa.

The study was carried out inside private hospitals; therefore, potential participants were only those who practice in the Addis Ababa private hospitals during the normal working hours of week days. The proportion of Physicians who have knowledge and perception of generic medicines may differ from what this study found due to excluding those Physicians who do not usually working or who works in the night or weekends.

1.8 Organization of the Study

This study is organized in five different chapters. Chapter one of the study introduces the research, the research variables and the context. The chapter contains the background information, statement of the research problem, research objectives, significance of the study, scope of the study, the study limitations and organization of the study. Chapter two will presents literature review that includes theoretical, conceptual and empirical literature of the main study variables. Based on the literature reviewed, a conceptual framework depicting the hypothesized relationship of the variables will be developed. Chapter three will presents the research methodology that include a description of the research design, the research philosophy, the target population, sampling design and sample size and operationalization of the variables. The chapter also will contain empirical models used in the study as well as data collection methods and instrument and lastly ethical considerations of the study. Chapter Four will presents the research findings, results of data analysis and a detailed discussion of the findings. The chapter also contains the descriptive statistics, diagnostic tests, and inferential statistics. Finally, Chapter Five will present the summary of research findings, conclusions, recommendations, contribution of the study to knowledge.

CHAPTER TWO

LITERATURE REVIEW

The chapter is intended to present the theoretical and empirical foundation for this research topic. While the first part concerns itself to the purely theoretical foundation, the second part presents a review of several empirical studies on the perception of physicians on the use of generic medications.

2.1 The Health Belief Model

The HBM derives from psychological and behavioral theory with the foundation that the two components of health-related behavior are 1) the desire to avoid illness, or conversely get well if already ill; and, 2) the belief that a specific health action will prevent, or cure, illness. Ultimately, an individual's course of action often depends on the person's perceptions of the benefits and barriers related to health behavior. The HBM is a health specific social cognition model (Ajzen, 1998), the key components and constructs (that is, complex theoretical components) of which are:

1. Perceived susceptibility: The subjective perception of the risk the individual is at from a state or condition.

2. Perceived severity: Subjective evaluation of the seriousness of the consequences associated with the state or condition.

3. Perceived threat: the product/sum of severity and susceptibility. This combined quantum might be seen as indicative of the level of motivation an individual has to act to avoid a particular outcome.

4. Perceived benefits: The subjectively understood positive benefits of taking a health action to offset a perceived threat. This perception will be influenced not only by specific proximal factors, but an individual's overall 'health motivation'.

5. Perceived barriers: The perceived negatively valued aspects of taking the action, or overcoming anticipated barriers to taking it.

6. Expectations: which are the product/sum of perceived benefits, barriers and self-efficacy. This may be seen as indicative of the extent to which the individual will try to take a given action (Smedslund, 2000)

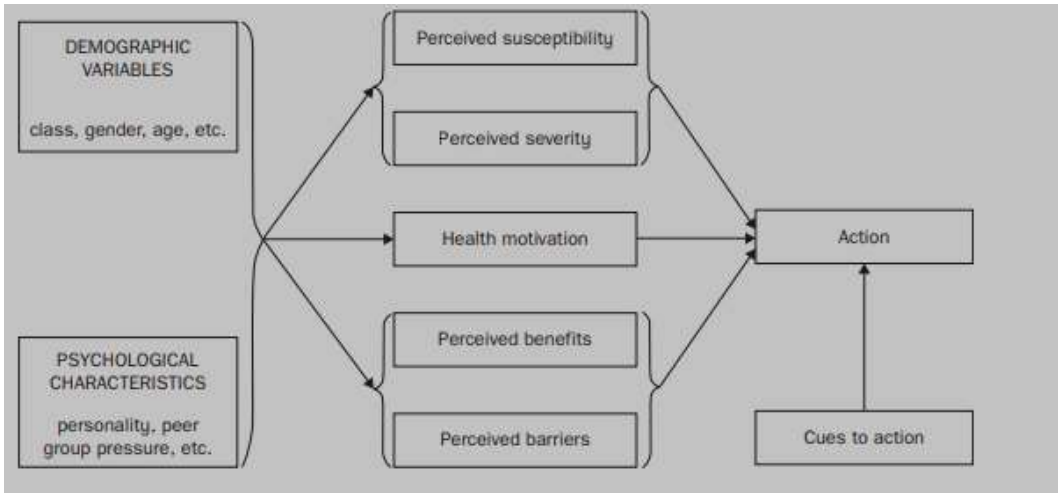


Figure 2.1. The Components of the Health Belief Model

- Cues to action: Reminders or prompts to take actions consistent with an intention, ranging from advertising to personal communications from health professionals, family members and/or peers.

HBM applied in a systematic way the full set of model components described above (to which may on occasions be added a general health perception variable) would have the potential to provide a relatively comprehensive understanding of the influence of social, economic and environmental factors on health behaviors, in addition to that of cognitive factors contained in the psycho-social equation at the heart of the HBM. However, the use of this model has in practice focused largely on measurements and analyses of susceptibility, severity, benefit and barrier perception components alone. The research literature analyzed during this review did not provide evidence that applications of the HBM have enabled the influence of social, economic or other environmental factors to be better understood by researchers, practitioners or policy makers. This conclusion is consistent with that of commentators such as Cochran and Mays (1993). They conducted a systematic review of the utility of the Health Belief Model as a guide for predicting breast cancer drug perception. Areas of use Hochbaum was originally concerned with the uptake of TB screening opportunities provided via mobile X-ray units. In that context

(in the early 1 950s, when new medicines for tuberculosis were becoming available) it was found that beliefs about susceptibility to the infection and the benefits of screening were strongly correlated with chest X-ray acceptance. Subsequent extensions of the model were associated with efforts to apply it in other contexts, including not only other forms of screening but also immunization and compliance with medical treatment for conditions (Becker, 1974, Rosenstock, 1974, Janz and Becker, 1984, Harrison et al., 1992 2-B). The development of the Health Belief Model was of pioneering significance in the early 1950s. Systematic analyses using the full range of components that it today incorporates might cast light on the impact of social and other factors associated with inequalities in health, and the reasons why individuals and groups may not take up health improvement or protection opportunities. However, the HBM is not in itself clearly or adequately specified, and the available evidence indicates that in practice its application appears to be inadequate for such purposes. Further, although the HBM may be used to derive information that may then prompt interventions designed to change health beliefs and behaviors, using the model itself cannot inform decision making as to how such interventions might best be structured. The value of the 'perceived threat' element serving as a central indicator of behavioral motivation in the HBM has been questioned. So has the phenomenological orientation of its design. Notwithstanding components like perceived barriers and demographic and socio-economic descriptors, as normally applied this model may be taken implicitly to assume that people are rational actors, driven by their conscious perceptions of the world. This may misleadingly suggest that health behaviors can always best be understood as being under volitional control, rather than in a large part determined by combinations of circumstantial reality and individuals' habitual, emotional, unconscious and/or otherwise non-rational reactions to the external world

2.2 Factors Influencing Physicians' Medicine Choice and Prescription

Medicine prescribing is a complex experience and is influenced by many medical and non-medical factors, all of which are relevant to issues of healthcare. Factors were grouped under three factors as technical, patient and social factors. Denig classified and utilize this classification method; technical factor, patient factor and social factor in 1994. Technical factors are factors related to physicians and medicines. Patient factors are patient-related factors. Patient's age, gender, socio-economic status and demands can be given as an example to this.

Social factors are factors such as health care systems and the cultural structure of the society (Denig, 1994).

Technical factor is the major factor affecting the physicians' perception and choice of medicines followed by patient factor and social factor. Among technical factor the most emphasized factors are the originality, efficacy, quality, costs and safety of the medicine, guideline and scientific studies. From the patient factor the main factors are socio-economic status and demands of the patient. Among the social factors medicine availability is the most emphasized factor (Spurling et al., 2010).

2.2.1 Technical Factors Affecting Physicians' Perception and Choice of Medicines

The main criteria affecting medicine choice are efficacy, safety, quality and cost of treatment. That is to say, medicine's ability to show the desired effects (efficacy), acceptable levels of adverse effects (safety), quality and the low cost induced to patients (cost of treatment) are the main criteria (İskit, 2006).

Several studies support the view that physicians have certain positive as well as negative expectations regarding the treatments on which they base their choice. Expectations that have been found to influence the medicine choice concern medicine aspects like, quality, efficacy, side effects, cost, and other aspects. These expectations can differ between individual physicians leading to variations in medicine choice and prescribing behavior. Also, the importance or so-called 'weight' individual physicians attach to each aspect varies and can influence the final choice. For example, if a certain physician believes that a high degree of safety, quality and efficacy are more important than low costs or few documented side effects, the latter aspects might have little influence on his choice. Whereas another physician might put more weight on the costs, and, consequently, choose a different treatment (Tan et al., 2009).

2.2.1.1 Cost of the Medicines

In the changing health care industry, however, prices may be expected to influence the choice of medicines prescribed by physicians. Prescription medicine cost has increased over time and progressively patients pay a higher percentage of the medicines' cost. Physicians are increasingly competing for patients. Therefore, it is known that physicians, trying to accommodate their patients' cost sensitivity, will act in a cost-sensitive way even though they do not directly bear the

cost of the medicine bearing in mind the importance of prescribing the quality medication that would lead to efficacious treatment with few side effects to the patient. (López-Valcárcel et al., 2011)

Studies show that the availability of generic medicines makes the cost sensitive physicians switch from brand name medicines to generic medicines. A study showed that besides other therapeutic and compliance factors the cost of a medicine affect the prescription decision of physicians (Tichelaar et al., 2010). For instance, one study showed that 88% of physicians are conscious about cost of a medicine during prescription decision and another study also said 71% of the physicians are willing to scarify efficacy to make medicines more affordable to their patients (Buusman et al., 2007)

Physicians shift their prescription from branded to generic medicine because these physicians believe that they reduced the financial burden of their patients by prescribing cheaper generic medicines (Gonzalez et al., 2008). Likewise, physicians' prescription decision is also affected by the availability of insurance. For instance, physicians become more price sensitive when they treat patients without insurance coverage and they prescribe cheaper medicines but when these doctors find out that their patients are reimbursed generously, they become price insensitive to prescribe branded medicines (López-Valcárcel et al., 2011). In conclusion, more specifically, the issues of medicine cost and patient insurance coverage concern the majority of physicians, who take these factors into consideration during their prescribing decisions.

2.2.1.2 Quality of Medicines

Quality of medicine use is highly relevant issues in modem health care (Cameron et al., 2011). Policies to improve the quality or decrease the costs of medicine use can focus on users (patients), as well as on producers (pharmaceutical industry), prescribers (physicians), and on other health care workers (such as pharmacists). Quality of products and trust on quality of a pharmaceutical company are the important ones among the several factors that influence physicians' prescribing (Moss & Schuiling, 2003). There are quite a number of empirical papers published on factors that influence physicians' prescribing behavior. Narendran and Narendranathan (2013) showed that the reputation of the company, quality of the medicine and brand names appreciably influences prescription. Their studies support the other previous

research findings that medicines, the reputation of the company, quality of the medicine, brand names are responsible for physicians' prescribing behavior. They suggest that the doctors normally prescribe a combination of both ethical and generic medicines with quality and the same efficacy for a specific disease.

2.2.1.3 Safety of Medicines

Safety is one of those variables that have been written extensively as determining factor for prescription. The clinical effectiveness and safety of pharmaceuticals are often considered to achieve the goal of therapy and enhance the patient compliance. Wierenga et al. (2003) assess the relative weight physicians attach to different outcomes of antibiotics, anti-astmatics, anti-rheumatics, and beta-blocking medicines. For each therapeutic group, physicians could choose from 16treatments which differed regarding efficacy, side effects, and costs. Based on a ranking of the treatments, it appeared that the physicians attached most importance to side effects (safety), followed by efficacy and costs.

Another similar study on medicine selection said physicians were asked to choose and rate 12 hypothetical medicines which differed regarding five attributes (efficacy, incidence of side effects (safety), costs per day, dosage schedule, and use by peers). Incidence of side effects (safety) was found to be of most importance (Kesselheim et al., 2008).

2.2.1.4 Efficacy of Medicines

The clinical effectiveness and safety of pharmaceuticals are often considered to achieve the goal of therapy and enhance the patient compliance. Efficacy is relatively more important when choosing a medicine for an acute disorder, whereas side effects and costs are relatively more important when choosing a medicine for a harmless disorder**.** These correlations indicate that, irrespective of the seriousness of the disorder, a physician gives the highest assessment to the medicine that is expected to have the highest efficacy. Gönül et al. (2012) shows that physicians' priority in prescription decision was efficacy of the medicine. He found that physicians seem to give the highest weight to efficacy.

2.2.2 Contribution of Medicine Knowledge on Prescription

Strategies that focus on the dissemination of knowledge, such as medicine bulletins, sometimes lead to changes in the physicians' knowledge and medicine choice behavior, one may not expect that having the correct biomedical knowledge about medicine treatments guarantees making the optimal medicine choices in practice (Hassali et al., 2009). In studies among general practitioners and hospital physicians, a decision model was used to assess the role of knowledge in the medicine choice process. The model included biomedical knowledge, patient demand, professional acceptability, and personal experiences as factors explaining the medicine choices of physicians. Each of these factors was weighed according to the importance value attached to that factor by the physician. According to the general practitioners' expectancies about biomedical (efficacy, quality, safety and side effect) knowledge was the most important factor when choosing a medicine (Sagar, 2012).

2.2.3 Other Factors

The information sources used by physicians have an important role in altering their perception and prescribing decisions. Although medical reference books and scientific literatures have a large theoretical importance, colleagues, clinical meetings and medical representatives are key sources of information used to prescribe new medicines. Information from pharmaceutical companies increases awareness on available medicines in the market (Spurling et al., 2010).

The physicians' attributes which include the clinical experience, specialty, continuous professional development and practice decision was the most frequently mentioned prescriber related factor. The exposure of physicians for different class of medicines and patient outcome are expected to increase with increased clinical experience and years of service. Experience leads to a personal, informal medicine list, which may conflict with new guidelines. Specialist physicians' influence on prescribing decisions is expected to be high (Joyce et al., 2011). Other factors like formulary and standard treatment guidelines and patient characteristics may play a role in influencing the physician's decision regarding medications (Sagar, 2012).

2.3 Generic Medications

WHO, define generic medicine as a pharmaceutical product that is usually intended to be interchangeable with an innovator product manufactured without a license from the innovator company and is marketed after the expiry date of the patent or other exclusive rights (WHO, 2004). A generic form of a medicine must have the same active substance, strength, route of administration, identity, quality, purity, efficacy and the same intended use of the brand name medicines. However, the generic and brand name formulations of the medicines can have some minor differences, such as the inactive ingredients; preservatives, flavours, colour, shape, and product packaging. Despite different regulatory guidance for marketing approval of generic medicines, bioequivalence testing is a fundamental regulatory requirement for approval of generic medicine (Cameron et al., 2010).

Generic medicines are manufactured under the same strict standards of FDA good manufacturing practice regulations required for originator products. The FDA requires generic medicines to have the same quality, safety and performance as brand name medicines. Since generic medicines use the same active ingredients and are shown to work the same way in the body, they have the same risks and benefits as their brand name counterparts. Healthcare authorities and users can be guaranteed that FDA approved generic medicine products have met the same stiff principles as the innovator medicines. All generic medicines permitted by the FDA have the same high quality, strength, purity, stability and bioequivalent as brand name medicines. The generic manufacturing, packaging, and testing sites must pass the same quality standards as those of brand name medicines (FDA, 2001).

2.4 Perception of Generic Medicines and its Impact on the Prescription of Generic Medicines

Perception is the process by which people select, organize, and interpret information to form a meaningful picture of the world. People can form different perceptions of the same stimulus because of three perceptual processes: selective attention, selective distortion, and selective retention (Kotler & Armstrong, 2006).

Low perceived quality, efficacy and safety is reported by the WHO, as a common reason for generic medicines' underuse, in addition to prescribers' concerns in relation to efficacy and

therapeutic equivalence (WHO, 2013). There are countries where the prescribing and dispensing of generic medicines versus originators is suboptimal. The reasons for this include physicians' concerns with the quality safety, efficacy, and bioequivalence of generic medicines versus originators, ease of remembering brand names as well as pharmaceutical company activities promoting concerns with generic medicines. These differences in perceptions regarding generic medicines have resulted in very different prescription rates for generic medicines across countries (Corrao et al., 2014). For instance, there is high acceptance of generic medicines among physicians in the UK translating into very high voluntary generic medicine prescribing rates. A variety of educational and other initiatives in the UK have resulted in generic medicine prescribing at 98% to 99% of medicines once they are available as generic medicines across a range of classes where there are no issues with substitution (Godman et al., 2013). In Malaysia, 85.1% of physicians routinely prescribed generic medicines, although this figure was lower among physicians in private medical centers (Fadare et al., 2016). This contrasts with Italy where ascertained that 87% of pediatricians do not prescribe generic medicines due to concerns (Fabiano et al., 2012).

2.4.1 The impact of Perceived Safety on The Prescription of Generic Medicines

Safety is one of those variables that have been written extensively as determining factor for physicians to prescribe medicines. Most physicians do determine the safety after monitoring patients' outcome. Therefore, safety really becomes a thing of the perception that physicians have of a particular medicine (Colgan et al., 2015).

In many countries, the perception of the safety and effectiveness of generic medicines is not good. This may be partly due to cultural norms that will require time to reverse. In the Netherlands, the government has run an information campaigns with the aim of increasing their knowledge of enrich medicines alternatives to originator medicines (King & Kanavos, 2002).

The FDA examines generic formulations and approves them as bioequivalent to brand-name medicines in safety, strength, and quality. Therapeutic and safety equivalence between medicine products is assumed, from a regulatory perspective, on the basis of quality equivalence. This is evidenced from bioequivalence and chemical data (Nightingale, 1998).

If physicians harbor doubts, regarding the standards of generic medicines, they are often in a position to refuse prescribing them. Thus, ensuring the quality, safety, and efficacy of generic medicines is an important policy imperative. Generic medicines have in the past been criticized for being substandard or suffering from major quality problems (King & Kanavos, 2002).

One study showed that those physicians, who are more concern about the safety of the medicines, are less likely to prescribe generic medicines. The opposite conclusion is also possible which states that physicians who are concerned about the safety of medicine are more likely to prescribe branded medicines (Shrank, 2011).

2.4.2 The Impact of Perceived Quality and Efficacy the Use of Generic Medicines

The quality of any medicine is a clear indication of the efficacy of that medicines and this is enforced and monitored by the relevant institutions tasked with this responsibility. Most of the pharmaceutical companies have systems in place to check the quality of medicines on an on-going basis during manufacturing (FDA, 2007). One study showed that those physicians, who are more concerned about the quality of the medicines, are less likely to prescribe generic medicines. Another study said an important barrier to increased use of generic medicines is the belief that generic medicines are less effective. Although most physicians accept the replacement, many do not accept it because they believe that it does not have the same effect or it differs from the reference medicine in pharmacology aspects (Theodorou et al., 2009).

Generic medicines are believed have similar quality and to provide therapeutic effects similar to those of their brand name alternative (Nightingale, 1998). Health professionals and consumers can be assured that FDA approved generic medicines have met the same rigid standards as the innovator medicine (FDA, 2007). Although some physicians may argue that some cases generic medicines do fail to give desirable results. One expects the regulatory body as well as the pharmaceutical companies that make these medicines to continue carrying out post market monitoring of the medicines. In the advent of manifestation of negative feedback on the standard of the medicine to withdraw such medicine from the market immediately. Already we have seen cases where medicines that were previously approved by FDA for circulation to the people have had to be withdrawn from the market. A classical case was Vioxx, which was supposed to be Merck's pharmaceutical innovator company medicine for arthritis, has been shown by post

market monitoring that it could lead to increased risk of heart attack and stroke in patients taking the medicine. When Vioxx was approved, these cardiac side effects were not manifest, but as soon as it became clear that it is a cardiac risk to give Vioxx to patients, it was withdrawn. The reality is that this is a branded medicine that had to be withdrawn. Perhaps this will never be the case of generic medicines as they are made from the formula of branded medicines of which post market monitoring has been done (O'Rourke, 2006).

2.4.3 The Impact of Cost Implication on Health Care Delivery Due to the Use of Generic Medicines

Previous study that was carried out shows that, brand name medicines are typically more expensive than generic versions of the same medicine, which in general have identical therapeutic effects. A research work on the variable cost of health care said, there is a general perception with substantiated facts that, broad prescribing of generic products would achieve savings without compromising safety. Generic medicines are believed to provide therapeutic effects similar to those of their brand name alternatives (Nightingale, 1998). Haas et al. (2005) carried out a survey to examine the potential savings associated with generic medicine and arrived at the conclusion that greater use of generic medicine could result in important health care savings in the United States while maintaining quality of care.

There is no question that prescription of generic medicines can be extremely cost effective (Strom et al., 1974). This is because the production of generic medicines does not attract the extra cost of research and development that the production of new medicines requires. However, it is not always the case that generic medicines are cost effective compared to brand name medicines because if a generic medicine fails, it becomes more expensive to salvage the situation. Thus, there is a certain risk attached to the use of generic medicines if there is an issue of lack of consistency in quality among generic medicines (Bloom et al., 1986). However, in terms of purchase price alone, generic medicines are less expensive in the vast majority of cases (Kendall & Schoner, 1991).

2.5 Impact of Knowledge about Generic Medicines on the Use of Generic Medicines

Knowledge about generic medicines similarity with brand medicines in terms quality, safety and efficacy has impact on generic medicines prescription. We can note that those with better

knowledge about generic medicines have higher preference for prescribing them, being the perception on equivalent quality the main determinant factor in the choice of generic medicines (Keenum et al., 2003). According to Salhia et al. (2015) the most important factors that influence infrequent prescribing of generic medications by physicians is low level of knowledge about generic medicines. Many doctors remain skeptical because of the lower price of generic medicines, associating it with lower quality even though, generic medicine manufacturers do not have to spend extra money for medicine discovery, pre-clinical and clinical trials, makes generic medicines to be cheaper in price than that of the innovator medicines. A qualitative study in in Basrah, Iraq identified major barriers in using generic medicines was the physicians' belief that generic medicines are not equivalent to branded counterparts. The study also concludes that physicians' lack of knowledge could have a negative impression on the future of generic prescribing (Sharrad et al., 2009).

2.6 Empirical Review

2.6.1 Clinical Comparison of Brand Medicine and Generic Medicine

The basic reason why these medicines are of lower cost is due to the fact that they do not have to undergo the large, expensive clinical trials that are required for the approval of brand name medications. However, such fact gives rise to questions about the quality and safety of generic medicines. Wazana (2000) reported that many studies are conducted to test the therapeutic bio-equivalence of generic medicines prior to marketing and there is a wealth of available published studies assuring the safety and efficacy of these generic medicines.

Although there is concern among physicians that brand name medicines are clinically superior to generic alternatives, different clinical studies assured that generic medicines are bioequivalent to branded alternatives: a systematic review and meta-analysis that summarized clinical evidences by using peer-reviewed publications has concluded that there is no evidence that support the notion of brand medicines used in cardiovascular disease are superior to generic medicines (Kesselheim et al., 2008). A randomized clinical trial by Cohen et al. (2015) also concludes as treatment for relapsing-remitting multiple -sclerosis, glatiramer acetate generic medicine and brand medicine had equivalent efficacy, safety, and tolerability. Similarly, bio-equivalent study of procainamide in patients with ventricular dysarhythmias found no differences in effectiveness between the generic and brand-name versions (Kasmer et al., 1987). A retrospective study

conducted on 17 patients with schizophrenia and schizoaffective disorder also showed no safety and dosage requirements differences between Clozanil® and generic clozapine groups for any of the outcomes measured (Sajbel et al., 2001).

2.6.2 Knowledge of Physicians on Generic Medicine

Regarding physicians knowledge on generic medicine, some studies showed gap in knowledge and others good knowledge. A study conducted in the USA in 2005, showed that three fourth of physicians support generic substitution in most cases, with 17% said they would prescribe generic medicines in all cases when they are available. Only 5% of doctors indicated they did not support generic substitution. Ninety percent of physicians surveyed believed they were knowledgeable enough about generic bioequivalence to instruct informed substitution of generic medicines for brands. Sixty-nine percent indicated that therapeutic index influenced their decision to prescribe a brand over a generic, while 75% thought that certain medicines that have a narrow therapeutic index should never be substituted for generic medicines (Barrett, 2005). A similar study was conducted in Riyadh, Saudi Arabia., Ninety-six percent of physicians said they had enough knowledge about the therapeutic value of generic medicines to prescribe them in confidence (Alghasham, 2009).

A cross-sectional nationwide survey targeting physicians from private medical centers was conducted in Malaysia in 2015. Physicians were asked the question whether generic medicines being bioequivalent to their reference product. More than half of the respondents believed that generic products were bioequivalent to their branded counterparts. The majority of the participants, 70.7% and 84.1%, mentioned that generic medicines should be in same dosage form, and should have same dose strength as the branded product, respectively (Kumar et al., 2015).

In Ethiopia Mekelle city, a study tried to assess knowledge of physicians on generic medicine use in private clinics stated more than half of physicians (51.1%) believe as they are totally similar, 28.6% they believe as they have some difference and 8.2% for sure they believe as they have complete (Gebrekirstos et al., 2016). However, another study in Mekelle said that more than half of the respondent beliefs generic medicines have different active ingredients than a brand innovator (Workneh et al., 2017). A cross-sectional survey on perception and concern of

physicians regarding generic medicines in Gondar town identified majority of physicians indicated a very low generic medicine prescription rate and almost all of physicians agreed/ strongly agreed that they need a standard guideline to both prescribers and pharmacists on brand substitution processes. Majority of physicians (83.2%) expressed a need for more information on the issues pertaining to the safety and efficacy of generic medicines. It is also interesting to note that 39.9% of the physicians agreed/strongly agreed that medicine advertisements and promotion by the manufacturers would influence their prescribing practice (Gebresillassie et al., 2018).

2.6.3 Perception of Physicians towards Generic Medicines

Several empirical studies identified that a meaningful proportion of physicians have apprehensions about the efficacy, safety and quality of generic medicines. Negative perceptions that are founded in empirical evidence, if unaddressed, can negatively influence prescription of generic medicines.

2.6.3.1 Perception of Physicians towards Quality of Generic Medicines

Physicians from different countries expressed their concern about the quality of generic medicines. Differences in physicians' perceptions regarding quality of generic medicines have resulted. Theodorou et al. (2009) in Greece and Cyprus finds significant portion of physicians have positive perception about quality of generic medications. Fifty-one percent of physicians in Greece and 60% of physicians in Cyprus rated the quality of generic medicines compared to brand name medicines to be satisfactory or excellent. Another study from Greece also said physicians' perception regarding the quality of generic medicines was in general positive. More than half of the physicians characterize the quality of generic medicines in terms of efficacy, safety and effectiveness as 'very high' or 'high' when compared with the respective original products (Tsiantou et al., 2009). However, opposite findings to the above study are identified. A systematic review that analyzed 52 articles of identified that a significant proportion doctors hold negative perceptions of generic medicines, perceiving generic medicines as inferior in quality than branded medication (Colgan, 2015). A study from Saudi Arabia also said almost half of physicians reported negative perceptions about quality of generic medications (Salhia et al., 2015).

One study in Guatemala said that among physicians' participants expressed at least some reservations about the use of generic medications, with typical comments including that, they are not adequately manufactured," "they don't have good quality control," and "they don't offer the same results to the patient." Physicians also acknowledged the heterogeneity of generic medicine quality, which was perceived to be dependent on the reliability of the manufacturer. Some physicians reasoned that the low cost of generic medicines was itself indicative of inadequate quality (Flood et al., 2017).

A study in Iraq identified that quality of generic medicine deters physicians from prescribing generic medicines. Some physicians believe that generic medicines differ from the innovative-brand in terms of quality and safety, and this prevents them from prescribing generic medicines to their patients. Physicians were questioned about the factors they took into consideration when prescribing a medicine to their patients. Among factors identified quality profile of the medicine was the most mentioned (Sharrad et al., 2009).

2.6.3.2 Perception of Physicians towards Efficacy of Generic Medicines

Significant portion of physicians have a positive perception of generic medicines effective is equivalent to brand counterparts. However, differences in Physicians' Perceptions regarding efficacy of generic medicines have resulted. Alghasham (2009) conducted a study in Riyadh, Saudi Arabia found that 82% of doctors have perceived confidence in prescribing generic medicines that are governmentally approved. However, 35% of doctors who participated in the study indicated that therapeutic failure is a serious problem with some generic medicines. A survey conducted in Greece and Cyprus also said more than half of physicians have a positive perception of generic medicines effective is equivalent to brand counterparts. Proven clinical effectiveness was found to be the most influential factor for prescribing medication for over 90% of physicians in both Greece and Cyprus. Effectiveness of generic medicines was rated as satisfactory or excellent by 52% of Greek physicians and 62% of the physicians in Cyprus. Overall only 25% of physicians in Greece indicated that they prescribed generic medicines instead of brand name medicines often or very often versus 67% in Cyprus (Theodorou et al., 2009). Similarly, a study from US finds approximately two third of respondents reported that generic medications are as effective as branded medications, while quarter of physicians somewhat disagreed on generic medicines effectiveness. Approximately half of respondents

believed in the quality and effectiveness of generic medications and they prefer to take for themselves and recommend use generic medicines first for their family, while about quarter (29%) of the respondents disagreed (Shrank, 2011).

A study carried out in Korea on the perception of physicians towards generic medicines identified a significant portion of physicians have a negative perception of generic medicines effective is equivalent to brand counterparts. Over half of the respondents (53.2%) believed there was a difference in the effectiveness between generic medicines and original medicines, whereas 17.5% stated that generic medicines were therapeutically equivalent to original medicine and the rest remained neutral. Concerning their preference between original medicines and generic medicines, 76.7% of the respondents overwhelmingly preferred original medicines, while 21.1% did not discriminate between original medicines and generic medicines, and only 2.2% preferred generic medicines (Ryu & Kim, 2017).

Similarly, a cross-sectional nationwide survey targeting physicians from private medical centers in Malaysia said that physicians from private medical centers in Malaysia had negative perceptions about safety, quality and the efficacy of generic medicines. These negative perceptions could be the cause of the limited use of generic medicines in the private medical centers. Half of the physicians stated that generic medicines are less effective when compared to their reference product. Their beliefs about the low efficacy of generic medicines is further supported by another notion that the branded products are required to meet higher standards than generic medicines and 74.2% of the physicians thought in this way (Kumar et al., 2017). A study in Ethiopia, Mekelle city identified, majority of physicians do not have a positive perception of generic medicines. However significant portion of the physician's belief brand medicines are effective than generic counterparts and nearly three-fourth (72%) of the physicians always prescribe generic medicines (Workneh et al., 2017).

2.6.3.3 Perception of Physicians towards Safety of Generic Medicines

Differences in physicians' Perceptions regarding safety of generic medicines have resulted in many countries. Therapeutic and safety equivalence between medicine products is assumed, from a regulatory perspective, on the basis of quality equivalence.

Theodorou et al. (2009) identified that Greece and Cyprus physicians have positive perception on the safety of generic medications. More than half (54%) in Greece and 68% in Cyprus rated safety of generic products as satisfactory or excellent. A similar study was conducted in private clinics and dispensary of Mekelle city, Ethiopia also stated the same, form all respondent physicians 59.2% strongly disagree or disagree, the generic medicines have more side effects than brand medicines (Hayelom et al., 2016). Nevertheless, another study in Mekelle said a significant portion of the physicians' belief brand medicines safer than generic counterparts (Workneh et al., 2017). Similarly, Colgan et al. (2015) also stated in the review a greater proportion of doctors held the perception that generic medicines were less safe to use than branded medicines and side effects are more frequently caused by generic medicines in comparison to brand counter parts.

In Islamabad, Pakistan most of the physicians were agreed with same safety of both low-cost medicines and high-priced medicines. Perception of physicians towards the side effects of the both generic and brand name medicines showed that small number (12.2%) physicians agreed that generic medicines produce more side effects than brand name medicines, and significant number of physicians (60.4%) did not agree with it. By comparing the safety of low-cost and high priced medicines 64.1% physicians strongly agreed that low-cost medicines are as safe as high-priced medicines, 29.2% physicians respond neutral while 6.7% physicians disagreed (Hassan & Khan, 2017).

2.7 Practical Reasons for Prescribing Generic Medicines

The choice of generic and brand medicines depends up on different factors like; the severity of the diseases where physicians chose brand medicines for severe pain, and the patient characteristics where physicians prescribe brand medicines if the patients is able to pay. Adequate information on bioequivalence as well as quality, efficacy, safety and toxicity profiles of generic medicines may generate more confidence among physicians (Figueiras et al., 2008).

Low cost of medicines were the main reasons for prescribing generic medicines in Mekelle, Ethiopia (Workneh et al., 2017). A study from Saudi Arabia assessed physicians' perceptions and attitudes towards generic prescribing by sending a self-administered questionnaire to a random sample of 900 physicians from primary healthcare, hospitals, or private practice. Overall

79% of physicians said they supported generic prescription. Seventy-two percent of physicians agreed that price difference influenced them to prescribe generic medicines. The study also found that 82% of doctors have perceived confidence in prescribing generic medicines that are approved governmentally approved. Further, 85 % were positive towards the government's role in enforcing physicians to prescribe generic medicines. An equal percentage of physicians felt pressured by patients to prescribe either brand medicines (41 %) or generic medicines (40 %) (Alghasham, 2009). In line with other studies, Gaither et al. (2001) found that generic prescription is chosen more frequently for a less severe illness.

Farhat et al. (2016) surveyed professional healthcare in the Arab countries, Iran, Belgium, and Italy to understand the impact of various factors on the acceptance and future prescription of generic medicines. Only 41% confirmed that they prescribe generic medicines while 32.5% do not prescribe them. The main driver for prescribing generic medicines was the medicine's approval by the FDA, a lower price (64.6%), efficacy (47.9%), safety (41.7%), and reputation of the manufacturer company (31.3%). Similarly, Hallersten et al. (2016) evaluated physicians' preferences of generic medicines in seven European countries said, for 68.8% of doctors who prescribe generic medicines, the main prescription driver was the medicine's approval by the FDA followed by the lower price (60.7%). Another study that examined the attitudes of physicians from various specialties (mostly general/family practice physicians) towards generic substitution in Jamaica; 49% of the physicians were mostly prescribed generic medicines willingly when the cost of generic substitutes was a significant factor (Gossell-Williams, 2007).

A study in Ireland assed the beliefs, perceptions and behaviors of physicians towards generic medicines said a majority of physicians, 30 of 34 participants, stated that they prescribe generic medicines actively. While the primary reason stated for this was the reduced cost, other reasons given included: being in a practice that was in favor of generic prescribing; patients' preference for a generic and being more familiar with the generic name. Most of the physicians (28/34) stated that there are times when they would preferentially prescribe the originator rather than an equivalent generic medicine. When asked about the reasons for the high usage of generic medicines, the most commonly stated reason (23/34 participants) was the influence of the pharmaceutical industry, most usually in the form of visiting medical representatives (Dunne et al., 2014). A cross-sectional descriptive study was conducted to evaluate Iranian physicians'

perception of generic medicines stated more than 70 %of participants tended to prescribe generic medicines if they were sure about their equivalency. According to participants' perspectives regarding the cost advantages of generic medicines, cost containment is a considerable factor for prescribing generic medicines (68 %) and was a more attractive option for low income patients (81 %). Finally, participants requested the support of government to improve the utilization of generic medicines and 84 % thought that more scientific evidence about the safety and efficacy of generic medicines in general can improve generic prescribing (Yousefi et al., 2015).

Paraponaris et al. (2004) conducted a study assessing the attitudes of French general practitioners (GPs) regarding generic prescribing and found that 76 % of the respondents confirmed their willingness to do so. Meeting with more than ten pharmaceutical sales representatives per week was a factor associated with reluctance for generic prescribing. Another study of GP's attitudes towards generic prescribing was carried out in Slovenia. The majority of GPs responded that they usually met their patients' demands for branded products. Further, 90 % perceived generic medicines to be as effective as branded medicines. Nevertheless, 25 % stated that they would only increase generic prescribing if additional clinical trials were presented (Kersnik & Peklar, 2006). Chua et al. (2010) evaluated GPs' knowledge and perceptions of generic medicines in Malaysia. The majority of GPs (85 %) claimed that they actively prescribed generic medicines. The GPs believed that a standard guideline on generic medicine prescription and information on the safety and efficacy of generic medicines were necessary to ensure quality in the use of generic medicines. The study revealed that the choice of generic medicine depended on the patient's socioeconomic background.

Physicians from various public hospitals in one of Malaysians' provinces were interviewed to explore their perceptions towards patented and generic medicines as well as factors influencing their prescribing decisions. The physicians reported that the factors mostly affecting their prescribing decisions included their own experiences, evidence from the literature, their patients' ability to afford the medication, and hospital policy (De Run & Felix, 2006). Theodorou et al. (2009) performed a comparison between Greek and Cypriot physicians generic prescription practice; only 25 % of the Greek physicians said that they often prescribed a generic product instead of a branded one compared with 66 % of physicians in Cyprus. When the physicians in the two countries were questioned regarding their motivation to prescribe a generic medicine,

approximately 60 % indicated the patient's out-of-pocket expenses for the medicine were important or highly important. In Italy, Fabiano et al. (2012) conducted a nationwide web-based survey aiming to evaluate the knowledge of generic medicines and prescribing habits of family pediatricians. Only 14 % stated that as much as half of their patients were treated with generic medicines. The major issues preventing generic prescribing were identified to be the widespread skepticism about the reliability of bioequivalence tests and the safety of switching from branded to generic equivalents. The authors concluded that more information regarding generic medicines and further research in the field were required to increase generic medicine prescribing among Italian family pediatricians.

2.8 Conceptual Framework

Assessing perception of physicians on generic medicine and prescription pattern are relevant. To do so points regarding generic medicine like knowing the similarity between generic and branded medicine in terms of quality, safety and efficacy, accepting or refusing the idea that generic medicines are similar in safety, efficacy and quality with branded alternatives and feeling towards generic medicine were considered. In addition, the study discovered factors that influence generic medicine prescription. According to the literatures, there are at least five main promoting or hindering determinants on perception and prescription of generic medicines: Cost, Quality, efficacy, safety and knowledge about generic medicines.

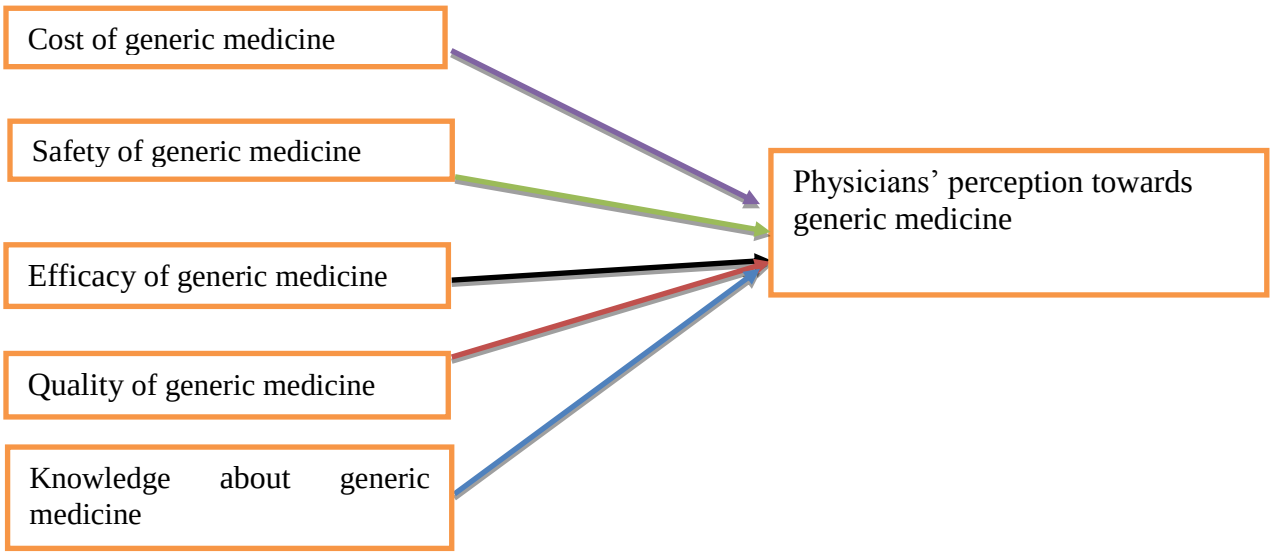


Figure 2.2a: Conceptual framework showing the factors influencing the perception towards generic medicine (Source; Own literature review).

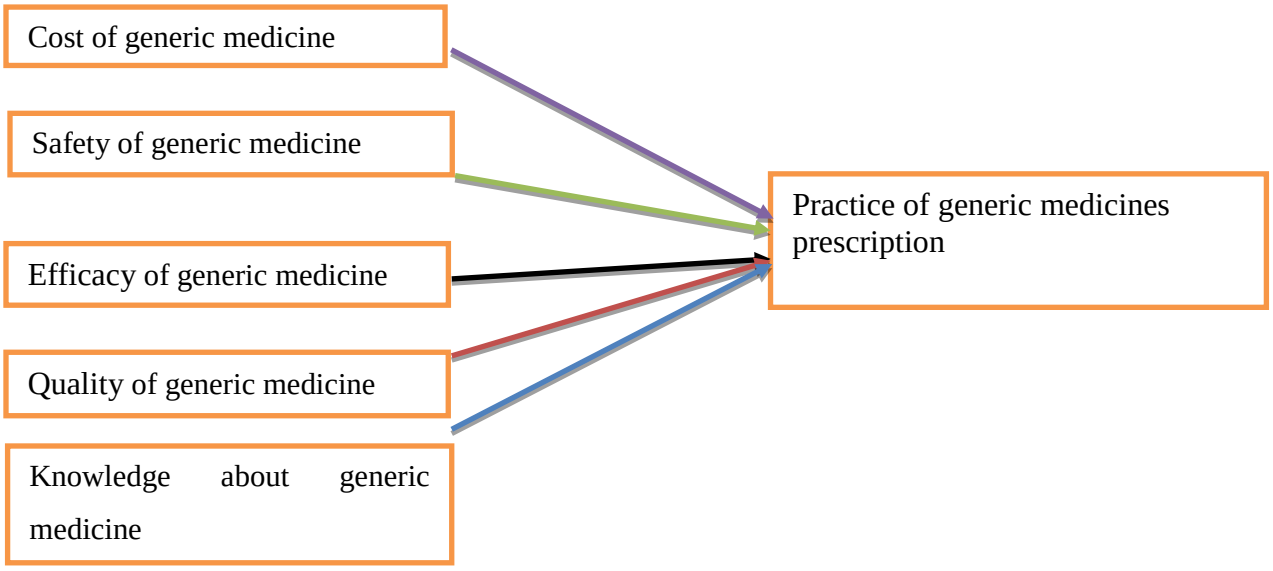


Figure 2.2b: Conceptual framework showing the factors influencing the practice of the generic medicines prescription (Source; Own literature review)

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter will present description of study area, the research approach, research design, data types and sources, population, sampling technique and sample size determination, data collection procedures, data analysis techniques, ethical considerations, instrument reliability and validity.

3.1 Description of the Study Area

The study was conducted from September 1, 2019 to February 30, 2020 at Addis Ababa, the capital city of Ethiopia. Addis Ababa has 10 Sub cities and 116 Woredas and covers an area of 540 square kilometers. Addis Ababa is the largest city in the country. The total projected population of the city is 3,384,569 with annual growth rate of 3.8%. There are 662,728 households in 628,984 housing units (CSA, 2007). There are 32 registered private hospitals actively giving health care service in Addis Ababa (EFDA, Inspection department; list of hospitals and number staffs in hospitals).

3.2 Research Approach

Quantitative research approach was employed to assess physicians' perception towards generic medicines and generic medicine prescription pattern. Quantitative research approach involves the generation of data in quantitative form which can be subjected to rigorous quantitative analysis in a formal and rigid fashion. In general, quantitative research is the systematic and scientific investigation of quantitative properties and phenomena and relationships (Bhattacherjee, 2012).

The objective of quantitative research is to develop and employ mathematical models, theories and hypotheses pertaining to natural phenomena. It usually starts a general statement proposing a general relationship between variables. Quantitative researchers favor methods such as surveys and experiments and will attempt to test hypotheses or statements with a view to infer from the particular to the general (Bhattacherjee, 2012).

3.3 Research Design

Research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. In fact, research design is the conceptual structure within which research is conducted; it constitutes the blue print for the collection; measurement and analysis of data (Kothari, 2004).

The researcher used descriptive and explanatory research design to assess physicians understanding and perception toward generic medications and investigating factors affect physicians in prescribing generic drugs. The purpose of the research was to analyze physicians understanding and perception toward generic medications and investigating factors that affect physicians in prescribing generic drugs in Addis Ababa private hospitals. In conducting this study descriptive research was used because we had prior knowledge about the problem situation as it was discovered through the past studies. As the name implies, descriptive research includes surveys and fact-finding enquiries of different kinds. The major purpose of descriptive research is description of the state of affairs as it exists at present (Kothari, 2004).

3.4 Data Types and Source

Both primary and secondary data were collected from various sources using data gathering instruments to make the study complete and achieve its predetermined objectives. Primary data were those which are collected afresh and for the first time and thus happen to be original in the character; from the field by the researcher which is subject to the topic under study (Kothari, 2004). The researcher used questionnaire as source of primary data. This enabled the researcher to obtain information which was relevant to the study because it was collected direct from the respondents. The researcher obtained secondary data from various source of information from journal, books and internet that contains relevant information for the study.

3.5 Population

The study targeted physicians practicing in private hospitals of Addis Ababa.

3.5.1 Source Population

The source population for this study was all physicians working in private hospitals of Addis Ababa who were actively prescribing at the time of the study, (from Monday to Friday; morning between 8 AM and 12AM and afternoon between 2 PM and 5 PM).

3.5.2 Target Population

The target populations for the study were all physicians actively working in the private hospitals of Addis Ababa and who were willing to participate in the study.

3.6 Sampling Techniques

It is a definite plan for obtaining a sample from a decided population. A better sampling technique has a smaller sampling error for an appropriate sample size at a reasonable cost. Two costs are involved in sampling analysis viz. cost of collecting data and cost of incorrect inferences like systematic bias and sampling error. A systematic bias results from error in sampling procedures which cannot be eliminated or reduced by increasing sample size. Natural bias of respondents in the reporting of data is often the cause of systematic bias (Kothari, 2004

Stratified random sampling was used to get information from different private hospitals. This technique is preferred because it is used to assist in minimizing bias when dealing with the population. With this technique, the sampling frame can be organized into relatively homogeneous groups (strata) before selecting elements for the sample. This step increases the probability that the final sample will be representative in terms of the stratified groups. The strata are type of private hospitals of Addis Ababa according to their service including: Generalized hospital, specialized hospital and teaching hospitals. To select samples of physicians from each strata (service given by the hospitals) simple random sampling method was applied from a complete list of physicians working in private hospitals of Addis Ababa.

Table 3.1 Sampling Frame

	Type of Hospitals	Total number of Physicians	Sample Size
1	Specialized Hospital	67	31
2	General Hospitals	268	124
3	Teaching Hospitals	105	50
	Total	440	205

3.7 Sample Size Determination

This refers to the number of items to be selected from the universe to constitute. The size of the sample should neither be excessively large; nor too small. It should be optimum; an optimum sample is one which fulfills the requirements of efficiency, representativeness, reliability and flexibility (Kothari, 2004). In Addis Ababa 32 registered hospitals (EFDA, Inspection department; list of hospitals and number staffs in hospitals) and 440 full time employee physicians working there. Since the number of physicians working in private health institutions was known the researcher used the formula for finite population to calculate the sample size. Krejcie and Morgan (1970) pointed that there was necessarily no need of calculations by using formula. In order to determine the sample size of given population, the table has to be considered. According to Krejcie and Morgan (1970) sample size table for known population; the sample size of 205 was satisfactory and representative for 440 populations. The satisfactory and representative sample size of this study was 205.

3.8 Data Collection Procedure

Data collection was conducted by a self-administered questionnaire. The questionnaire was carefully developed in a way that used to measure the impact of the proposed independent variables on the dependent variable. This self-administered questionnaire was developed with a five point Likert scale. Close ended questions were included in the questionnaire. The type of questions, form, wording and sequences were also considered carefully.

The questionnaire, comprising four sections, was adapted from a previous study. The first part was comprised socio-demographic variables and practice pattern of participants. The second part was about assessment of physicians' understanding of the concept of generic medicines knowledge of generics. Questions on physicians' perception of generic medicines safety, quality and efficacy were constituted the third part, while the last and fourth part questions were on factors affecting to prescribe generics. After pre-tested the instrument and informed the study participants about the stud's objective, the questionnaire was distributed and collected in the respective days.

The general advantage of the questionnaire method was that, it allowed collection of large amount of data from suitable population in a highly economical way. Questionnaire method had

the following advantages: time and money saving; good for respondents who couldn't offer audience to the researcher; it was free from the bias of the interviewee; answers were in respondent's words; respondents had adequate time to give well thought out answers and respondents who were not easily approachable can also be reached conveniently (Kothari, 2004). On other hand this method has the following disadvantages; it didn't work if respondents do not knew how to read and write; low rate of return of the duly filled in questionnaires; no supplementary information was collected and some respondents do not respond a situation which may affect the quality of the study and this method was likely to be the slowest of all (Kothari, 2004).

The researcher selected questionnaire survey for the following reasons. The rationale of using this strategy was free from bias of the interviewer because the answers were written in respondent's words. Further respondents were had adequate time to give well thoughts answers and also this was convenience for respondents who were not easily approachable were reached conveniently.

3.9 Operationalization and measurement of the variables

3.9.1 Dependent Variables

The dependent variables in this study were perception of generic medications and prescription pattern (practice) of physicians on generic medicines.

Perception mean in this study, was a physician's feeling towards the generic medicines utilizations.

Practice of prescription for generic medicines in this study was defined as prescription of generic medicine written by a duly authorized healthcare professional issued to a patient in order to collect medicine from dispensing unit.

3.9.2 Independent Variables

The independent variables of the study include quality, efficacy, safety and cost of generic medicines and physicians' knowledge about generic medicines. See Table 3.2 for the operationalization and measurement of variables.

Table 3.2 Operationalization and measurement of variables

No	Variable	Definition	Measurement	Effect on dependent variables (+/-)
1	Cost of generic medicine	The unit acquisition price of generic medicine from a supplier (Aldin et al., 2018).	Five point Likert scale (1= SD, 5= SA)	-
2	Safety of generic medicine	Evidence of an absence of harm and avoiding injuries to patients from the generic medicine care that is intended to help them (ICH, 1994).	Five point Likert scale (1= SD, 5= SA)	+
3	Efficacy of generic medicine	The capacity of generic medicine to produce an effect (to have a response to a generic medicine) (ICH, 1994).	Five point Likert scale (1= SD, 5= SA)	+
4	Quality of generic medicine	Generic medicine that meets its pre-specified quality attributes and standards and has been manufactured in according to GMP regulations (ICH, 1994).	Five point Likert scale (1= SD, 5= SA)	+
5	Knowledge of generic medicine	Describing that generic medicines are similar with brand medicines in terms of quality, safety and efficacy (FDA, 2001).	Five point Likert scale (1= SD, 5= SA)	+

SD= strongly disagree SA= strongly agree

3.10 Ethical Consideration

Before commencing the study, ethical clearance was obtained from Ethics Review Committee of College of business and economics, Addis Ababa University. In addition, the entire study participants were informed about the purpose of the study and finally their oral consent was obtained before giving the questioner. The information provided by each respondent was be kept confidential and was only be used for research purpose.

3.11 Data Analysis

All statistical procedures were conducted using Statistical Package for Social Science (SPSS) version 23.0 software and relevant data analysis was needed to answer the research questions. Prior to analysis, the data was adjusted for omissions, legibility, and consistency. After the data file are checked and adjusted, coding was conducted.

The data analysis was made by using both descriptive and inferential statistics. Descriptive statistics such as frequencies, percentages, means and standard deviations were used to summarize and present the data. In addition to this, Pearson correlation coefficient was used to show the interdependence between the independent and dependent variables. In addition to the descriptive statistics, this study used linear regression analysis to examine the influence of the independent variables on the respective dependent variables. The regression model was formulated as follows:

Model 1: $Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \varepsilon$

Where Y= Perception towards generic medicines

X1=Cost of generic medicine, X2= Safety of generic medicine, X3=Efficacy of generic medicine, X4=Quality of generic medicine, X5= Knowledge of generic medicine, and ε was the error term of the regression equation.

Model 2: $Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \varepsilon$

Where Y is the Practice of generic medicines Prescription

X1=Cost of generic medicine, X2= Safety of generic medicine, X3=Efficacy of generic medicine, X4=Quality of generic medicine, X5= Knowledge of generic medicine, and ε is the error term of the regression equation. In both models, the βs was the parameter estimates of the regression model and α_s was the intercepts of the regression model.

3.12 Instrument Reliability and Validity

To examine the reliability of this study Cronbach's alphas was calculated for each variable by the researcher using SPSS. Accordingly, a Cronbach's alpha value of > 0.7 indicates a considerably high reliability. Therefore; Cronbach's Alpha values > 0.7 was used to indicate the higher degree of internal consistency in this study. According to Kothari (2004), reliability is a measure of how stable, dependable, trustworthy and consistent a test is in measuring the same thing each time. Most importantly, the data, the researcher analyzed should map to the research questions the researcher has tried to answer. This sounds obvious but is often overlooked or ignored because it can be inconvenient. Optimally, this means that the outcome measure should

accurately reflect the phenomenon of interest; the model should include all relevant predictors and generalize to the cases to which it would be applied.

Content validity is the extent to which a measuring instrument provides adequate coverage of the topic under study. If the instrument contains a representative sample of the universe, the content validity is good. Its determination is primarily judgmental and intuitive. It can also be determined by using a panel of persons who shall judge how well the measuring instrument meets the standards, but there is no numerical way to express it (Kothari, 2004).

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter presents the data presentation, analysis and discussion of the research findings. The data analysis was made with the help of Statistical Package for Social Science (SPSS v. 23). The data obtained from the main data collection were subjected to descriptive statistics analysis, comparing mean analysis (i.e. independent t-test and ANOVA) and other analyses (i.e. correlation analysis and linear regressions).

In order to make the collected data suitable for the analysis, all questionnaires were screened for completeness. All returned incomplete questionnaires were considered as errors and removed from the survey data. Out of the 205 distributed questionnaires, 200 were collected. During data editing, the collected questionnaires were checked for errors and 5 incomplete questionnaires were identified and discarded. Therefore 195 questionnaires were found to be valid and used for the final analysis, which represent 95 % valid response rate.

4.2 Findings of Quantitative Analysis

4.2.1 Reliability Analysis

Reliabilities of the scales were checked after coding and entry of data into SPSS version 23.0. Cronbach's alpha coefficients were computed for each scale to determine the internal consistency reliability of the instruments used in the study. As indicated below on table 4.1 all variables in this study have Cronbach's alpha value above 0.70 and the overall alpha value is 0.879 which shows the highly acceptability of the measurement scales used.

Table 4.1: Summary of Reliability Analysis

Reliability Statistics

	Cronbach's Alpha	N of Items
Knowledge about Generic medicines	.725	7
Cost of Generic medicines	.793	5
Quality of Generic medicines	.917	5
Efficacy of Generic medicines	.735	5
Safety of Generic medicines	.716	5
Perception of Generic medicines	.843	10
Practice of Generic medicines	.852	9
Mean of independent variables	.778	5

Source: ***Survey Result, 2020***

4.3 Descriptive Analysis

4.3.1 Demographic Profile of Respondents

Before starting the analysis of the data some background information such as demographic data, is useful in order to make the analysis more meaningful for the readers. The samples of this study have been classified according to several background information collected during questionnaire survey. The purpose of the demographic analysis in this research is to describe the characteristics of the sample such as the number of respondents, proportion of males and females in the sample, range of age, Marital status, specialty, service year, and others. The frequency distribution of demographic variables is presented below.

Table 4.2: Demographic Characteristics;

Items		Frequency	Percent
Age (Year)	21-30	14	7.2
	31-40	91	46.7
	41-50	68	34.9
	51-60	21	10.8
	>60	1	0.5
Sex	Male	139	71.3
	Female	56	28.7
Marital status	married	156	80.0
	Single	38	19.5
	Divorced	1	0.5
Specialty	Internist	88	45.1
	Gynecologist	22	11.3
	Surgeon	21	10.8
	Pediatrician	58	29.7
	Others	6	3.1
Year of Service	≤5	10	5.1
	6-10	68	34.9
	11-15	99	50.8
	≥ 16	18	9.2
Number of daily visited Patients	5-10	21	10.8
	11-15	101	51.8
	15-20	50	25.6
	>20	23	11.8
Number of Daily visited Medical Representatives	<5	129	66.2
	5-10	54	27.7
	>10	12	6.2

Source: ***Survey Result, 2020***

As the Table 4.2 shows, out of 195 respondents, the male physician constituted the highest percentage 139 (71.3%) while their female counterparts only constituted 56 (28.7%) of the total respondents. This implies that the majority of physicians who are diagnosing and treating patients in private hospitals are male. Regarding to age, 91(46.7%) of the respondents were in the age group of 31-40 years old, 68 (34.9%) were in the age group of 41-50 years old while only, 21 (10.8%) were 51-60 years old. This indicates that, majority of the participants were between the age 31 and 40. Majority of the respondents 156 (80%) were married and 38(19.5%) were single. With respect to specialty, half of 88(45.1%) respondents were internists, 58(29.7%) respondents were pediatrician, the remaining were surgeons 21(10.8%), gynecologist 22(11.3%)

and others specialist 6(3.1%). This indicates that, of the total of respondents with different specialty, Internists, gynecologist, surgeons and pediatrician were the leading one in descending order. According to the finding, half of the physician's 99(50.8%) serve for 11-15 years 68(34.9) serve for 6-10 years. Half of physcians101 (51.8%) diagnose or treat 11-15 patients per day, 50(25.6) of physicians diagnose or treat 16-20 patients per day, 23(11.8%) of physicians diagnose or treat more than 20 patients per day, while 21(10.8%) of physicians diagnose or treat 5-10 patients per day, According to the finding, More than half 129(66.2%) of physicians were visited by less than five medical representatives in a month, 54(27.7%) of physicians were visited by 5-10 medical representatives in a month ,while only 12(6.2%) physicians were visited by more than 10 medical representatives in a month.

4.4 Descriptive Statistics of variables

Descriptive statistic of means and standard deviations were obtained from the independent and dependent variables. The descriptive analysis is used to look at the data collected and describe that information. Mean value provides the idea about the central tendency of the values of a variable. On the other hand, Standard deviation gives the idea about the dispersion of the values of a variable from its mean value.

Table 4.3: Descriptive Statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Knowledge	195	3	5	4.03	.389
Cost	195	2	5	4.00	.560
Quality	195	2	5	4.07	.744
Efficacy	195	3	5	4.29	.522
Safety	195	2	5	4.02	.481
Perception	195	3	5	4.02	.496
Practice	195	3	5	4.43	.409
Valid N (listwise)	195				

Source: ***Survey Result, 2020***

Table 4.3 shows that all variables; Knowledge about generic medicines, cost, quality, safety, efficacy and safety of generic medicines have mean score above average and it shows perception

towards of generic medicines and generic medicine prescription are affected by all independent variables.

Correct knowledge and understanding of generic medicines as being clinically interchangeable and with the same efficacy, safety, and quality as the original brand medicines are important factors for acceptance and increased use of generic medicines. While assessing physicians' knowledge about generic medicines, it was observed that most of the physicians had good knowledge about them. As indicated on annex 2; the majority (83.6%) strongly agree/agree that Generic medicines are copy and interchangeable with brand name medicines, 78.4% also knew generic medicines approvals must be based on scientific considerations and minimize duplicative testing, more than three fourth (81%) strongly knew that they have the same active substance, more than half (62.1%) said they must be in the same dosage, three fourth of physicians (73.3%) knew generic medicines can have some minor differences, almost half (52%) knew generic medicines are manufactured after the expiration of the patent of the originator medicines. However, only somewhat half of (56.9 %) knew generic medicines are available in the market of Ethiopia.

Regarding cost of generic medicines physicians' significant number of physicians didn't accept affordability and potential cost-savings from generic medications while maintaining quality of treatment. More than three fourth (85.1%) strongly agree and agree that generic medicines are more affordable than brand name medicines, 65.1% strongly agree/ agree that they can reduce the cost of treatment than brand name medicines, 64.5% strongly agree/ agree they have the potential to reduce the price of other brand name medicines , 54.4% strongly agree/agree generic medicines are cheaper because no extra cost of research and development However, 49.3% strongly agree/ agree they provide health care savings while maintaining standard of health care service (annex 2).

More than half physicians expressed their concern about the quality of generic medicines. While asking generic medicines are as good quality as brand name medicines, only 30.3% agree and 9.7% strongly agreed. While more than half (54.3%) agreed/ strongly agreed that generics are manufactured according to GMP guidelines. Less than half (45.6%) agreed/ strongly agreed quality control on generic medicines similar to the originators. Only 42.5% and 40.5 % agreed

/strongly agreed with the statements that generics are bioequivalent to originators and Generic companies conduct PV respectively (annex 2).

Almost half physicians expressed concern about the efficacy of generic medicines. this study finds that half of respondents (51.8%, 49.7%, 45%, 47.2%, and 48.7%) strongly agreed/agreed that generic medicines are therapeutically equivalent to brand name medicines and have similar PK and PD respectively, FDA approved generic medicines in terms of efficacy, they provide identical clinical effects and have similar bio-availability variability as brand medicines respectively (annex 2).

Significant numbers of physicians were concerned about safety of generic medicines. Almost half (54.4%, 55.3%, 57.2% ,52.3% and 50.8%) of physicians strongly agreed/ agreed that generic medicines were safe as, had side effect, ADR and induce medicine-related mortality similar to brand name medicines and FDA approved them in terms of safety respectively (annex 2).

In this study misconceptions and negative perceptions regarding generic medicines among physicians were found. From the respondents, more than three fourth (80.5% & 80.6%) of physicians believed generic medicines contributed to cost-effective management of disease and could improve access to medications respectively. Significant number (65.6% & 59%) of physicians believed that generic medicines were only meant for poor and made with lower quality therapeutic substances respectively. Fifty five percent of physicians believed generic medicines don't offer the same and take longer time to give response as the originators. Half (51.1 % & 53.4 %) of physicians believed there was lack of quality check and post market surveillance in generic medicines compared to the originators and lead to more side effects and ADR than brand name medicines respectively. Less than half (44.1%) of physicians believed generic medicines were used different inactive ingredients, introducing the potential to compromise their quality, 35% believed treatment failure was the main concern about generic medicines and 38% believed generic medicines potency was questionable (annex 2).

This study revealed that almost half of physicians didn't experience of prescribing generic medicines and prefer to prescribe brand medicines. This study shows that half (50.2%) of physicians felt safe while prescribing brand medicines, 40.5% of physicians preferred to prescribe Brand medicines for only complicated conditions while 49.2% preferred to prescribe

generic medicines for less serious diseases, 46.7% said will switched to the generic alternative, if generic alternative for branded medicines were available and 34.4% also said patients preferred to be prescribed a brand drug. However, 43.1% of physicians were pressured to request more frequent follow-up visits and for additional examinations while prescribing generic medicines. Bellow half (34.3%) of physicians said generic medicines will discriminate their patients according to their out-of-pocket capability to purchase originals, whereas 46.6% said generic medicines will facilitate their patients' compliance. Finally only 43% of physicians had a good practical experience with generic medicine (annex 2).

4.5 Pearson Correlation Analysis

In order to determine the association between independent (Knowledge about generic medicines, cost, quality, efficacy and safety of generic medicines) and the dependent variables (physicians perception towards generic medicines and practice with generic medicines), correlation analysis and Pearson correlation was computed.

The table 4.4 shows except cost all the independent variables are significantly and positively correlated with dependent variable (Knowledge about generic medicines ($r=0.697$, $p<.001$, quality of generic medicines, ($r=0.752$, $p<.001$), safety of generic medicines($r=0.793$, $p<.001$), efficacy of generic medicines ($r=0.658$, $p<.001$) and cost of generic medicines ($r=0.391$, $p<.001$). Except cost all independent variables have positive and significant correlation with perception towards generic medicines. However, cost has positive and moderate correlation with perception towards generic medicines.

Table 4.4: Pearson Correlation Analysis of model 1

Correlations

		Knowledge	Cost	Quality	Efficacy	Safety	Perception
Knowledge	Pearson Correlation	1	.511**	.356**	.528**	.456**	.697**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	195	195	195	195	195	195
Cost	Pearson Correlation	.511**	1	.197**	.427**	.270**	.391**
	Sig. (2-tailed)	.000		.006	.000	.000	.000
	N	195	195	195	195	195	195
Quality	Pearson Correlation	.356**	.197**	1	.448**	.581**	.752**
	Sig. (2-tailed)	.000	.006		.000	.000	.000
	N	195	195	195	195	195	195
Efficacy	Pearson Correlation	.528**	.427**	.448**	1	.588**	.658**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	195	195	195	195	195	195
Safety	Pearson Correlation	.456**	.270**	.581**	.588**	1	.793**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	195	195	195	195	195	195
Perception	Pearson Correlation	.697**	.391**	.752**	.658**	.793**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	195	195	195	195	195	195

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

Source: ***Survey Result, 2020***

The table 4.5 shows except cost all independent the independent variables are significantly and positively correlated with dependent variable (Knowledge about generic medicines (r=0.720, p<.001), cost of generic medicines (r=-0.336, p<.005), quality of generic medicines, (r=0.629, p<.001), safety of generic medicines (r=0.749, p<.001) and efficacy of generic medicines (r=0.652, p<.001). Except cost all independent variables have positive and significant correlation with generic medicines prescription. However, cost has positive and moderate correlation with generic medicines prescription.

Table 4.5: Pearson Correlation Analysis of model 2

Correlations

		Knowledge	Cost	Quality	Efficacy	Safety	Practice
Knowledge	Pearson Correlation	1	.511**	.356**	.528**	.456**	.720**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	195	195	195	195	195	195
Cost	Pearson Correlation	.511**	1	.197**	.427**	.270**	.366**
	Sig. (2-tailed)	.000		.006	.000	.000	.000
	N	195	195	195	195	195	195
Quality	Pearson Correlation	.356**	.197**	1	.448**	.581**	.629**
	Sig. (2-tailed)	.000	.006		.000	.000	.000
	N	195	195	195	195	195	195
Effcacy	Pearson Correlation	.528**	.427**	.448**	1	.588**	.652**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	195	195	195	195	195	195
Safety	Pearson Correlation	.456**	.270**	.581**	.588**	1	.749**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	195	195	195	195	195	195
Practice	Pearson Correlation	.720**	.366**	.629**	.652**	.749**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	195	195	195	195	195	195

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

Source: ***Survey Result, 2020***

4.6 Assumption Testing for Multiple Regressions

Meeting the assumptions of regression analysis is necessary to confirm that the obtained data was truly represented the sample and the researcher has obtained the best results (Hair et al., 1998). Three assumption tests were checked before regression analysis was undertaken. These are; Multi-collinearity, Linearity and Normality.

4.6.1 Multi-Collinearity

According to Ho (2006), the two most important conditions to be fulfilled before conducting regression analysis are the adequacy of the sample size and non- existence of correlation among the independent variables. The size of the sample has a direct effect on the statistical power of the significance testing in multiple regressions, which refers to the probability of detecting statistically significant R-square or a regression coefficient at a specified significance level. Ho (2006), also suggested that the sample size should be at least 20 times more than the number of

independent variables, as a rule of thumb, in order to get the desired level of statistical power. Given this rule of thumb, the number of respondents used for this study 195 is over the required criteria.

The other important condition for regression analysis is that there should not be interrelationship among independent variables. The situation in which the independent/predictor variables are highly correlated is known as multi-collinearity. When independent variables are multi-collinear, there is "overlap" or sharing of predictive power, which may lead to a situation where the regression model fits the data well, but none of the predictor variables has a significant effect in predicting the dependent variable (Ho, 2006).

According to Ho (2006) the existence of multi-collinearity can be checked using the "Tolerance" and "Variance Inflation Factor (VIF)" values for each predictor. The tolerance value is an indication of the percentage of variance in one predictor that cannot be accounted for by the other predictors. The value of tolerance should be above 0.10 and any value lower than this indicates the existence of multi-collinearity. On the other hand, VIF is computed as "1/tolerance," VIFs start at 1 and have no upper limit. A value of 1 indicates that there is no correlation between this independent variable and any others. VIFs between 1 and 5 suggest that there is a moderate correlation, but it is not severe enough to warrant corrective measures. VIFs greater than 5 represent critical levels of multi-collinearity where the coefficients are poorly estimated, and the p-values are questionable (Saunders et al., 2009).

For this particular study, as it can be seen from Table 4.6, both the values of tolerance and VIF calculated for each independent variable on both regression analyses fulfills the criteria discussed above, which indicate the non- existence of multi-collinearity. Value of tolerance for each independent variable is above 0.10 this indicates the nonexistence of multi-collinearity. VIF of each independent variable it almost closes to 1 that indicates that there is no correlation between this independent variable and any others.

Table 4.6: Multi-collinearity problem test of VIF and tolerance

Coefficients [a]

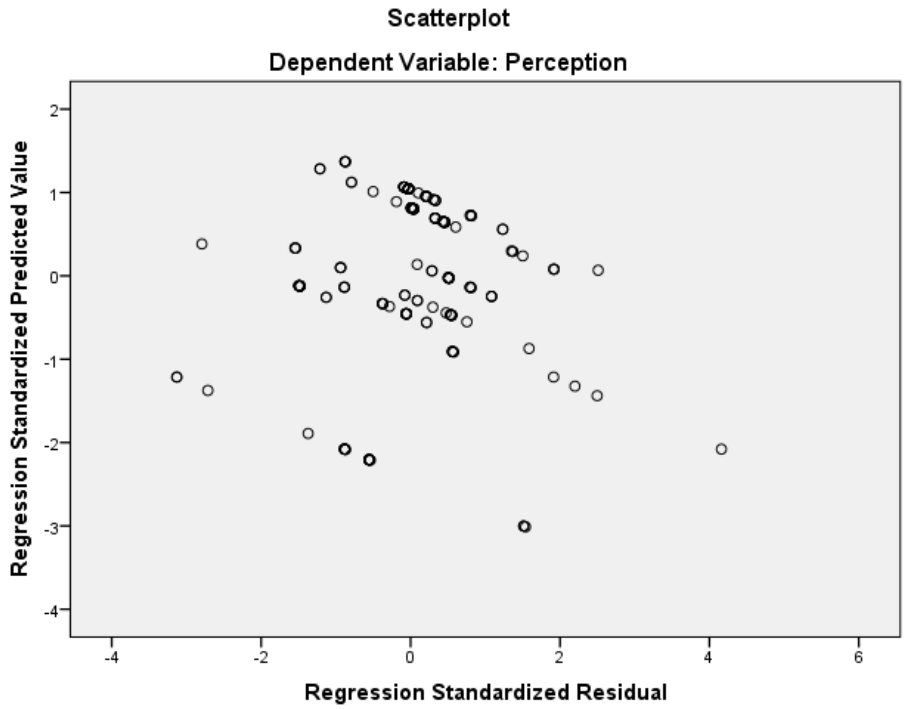
Model		Collinearity Statistics	
		Tolerance	VIF
1	Knowledge	.801	1.249
	Cost	.744	1.343
	Quality	.749	1.336
	Efficacy	.721	1.386
	Safety	.783	1.277

a. Dependent Variables: Perception and Practice

Source: ***Survey Result, 2020***

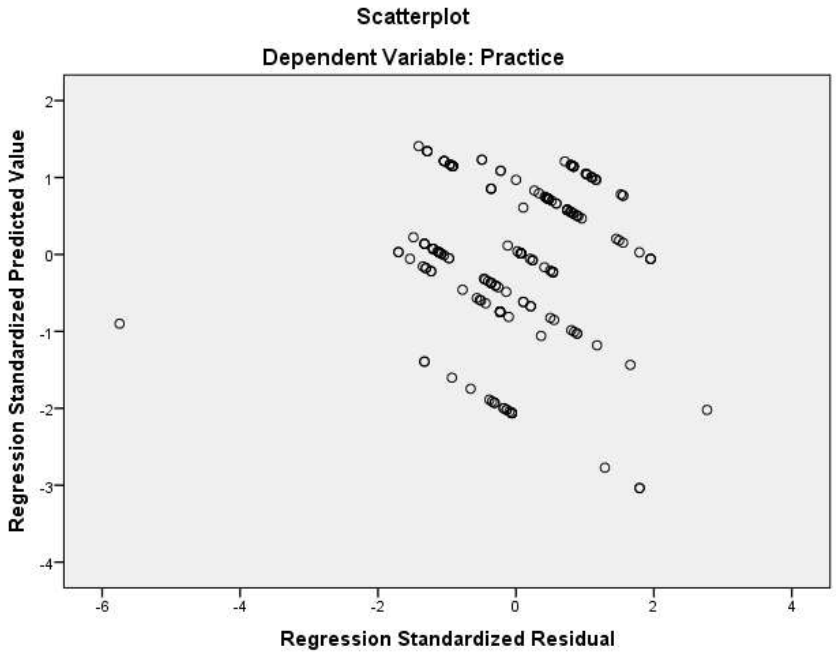
4.6.2 Linearity

According to Hair et al. (1998) the linearity of the relationship between the dependent and independent variable represent the degree to which the change in the dependent variable is associated with the independent variable. In a simple sense, linear models predict values falling in a straight line by having a constant unit change (*slope) of the dependent variable for a constant unit change of the independent variable. Conventional regression analysis will underestimate the relationship when nonlinear relationships are present, i.e., R^2 underestimates the variance explained overall and the betas underestimate the importance of the variables involved in the non- linear relationship (Malhotra and Birks, 2007). The scatter plot of standardized residuals versus the fitted values for the regression models is as follows.



Source: ***Survey Result, 2020***

<u>Figure 4.1:</u> Linearity scatter plot of regression standardized residual for model 1



Source: ***Survey Result, 2020***

<u>Figure 4.2:</u> Linearity scatter plot of regression standardized residual for model 2

You can see from both plots, the residuals that the trend is centered around zero but also that the variances around zero is scattered uniformly and randomly. We conclude that the linearity assumption is satisfied and the hetereoskedasticity assumption is satisfied if we run the fully specified predictive model.

4.6.3 Normality of the Error Term Distribution

Normality refers to the shape of data distribution for an individual metric variable, and its correspondence to the normal distribution (Hair et al., 2003). For estimating normality, skewness and kurtosis information values were observed, and probability plots were also drawn. Skewness provides information regarding the symmetry of the distribution, whereas Kurtosis 'provides information regarding peakedness of the distribution (Pallant, 2001). According to Hair (2010), the most commonly acceptable value for (kurtosis/skewness) distribution is ±2.58. As table 4.7 and 4.8 shows, all values of skewness and kurtosis for the transformed and standardized values have been found to be within the acceptable range.

Table 4.7: Skewness and Kurtosis for model 1

Descriptive Statistics

	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
Knowledge	195	-1.298	.127	1.971	.254
Cost	195	.059	.127	-.772	.254
Quality	195	-.220	.127	-.893	.254
Efficacy	195	-.217	.127	-.638	.254
Safety	195	-.032	.127	-.652	.254
Perception	195	-.651	.127	1.227	.254
Valid N (listwise)	195				

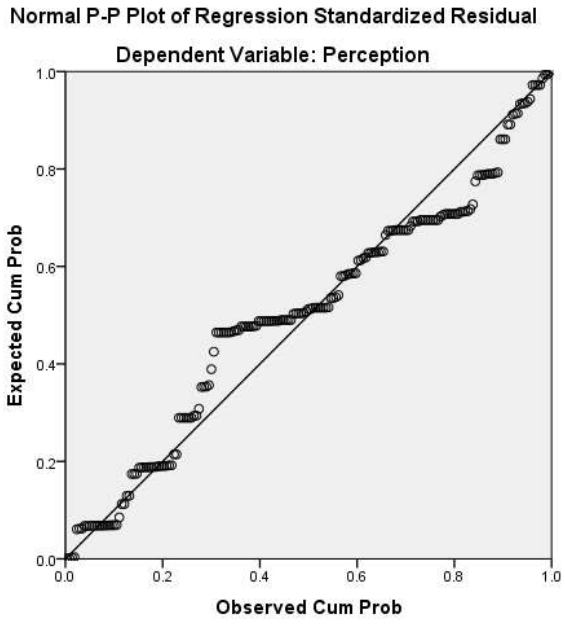
Source: ***Survey Result, 2020***

Table 4.8: Skewness and Kurtosis for model 2

Descriptive Statistics						
	N	Mean	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Knowledge	195	0.55	-.424	.237	-.457	.469
Cost	195	2.01	.099	.237	-.546	.469
Quality	195	-1.22	-.469	.237	-.634	.469
Efficacy	195	1.08	-1.697	.237	1.579	.469
Safety	195	1.82	-.904	.237	1.226	.469
Practice	195	-.297	.127	-.638	.254	-.297
Valid N (listwise)	195					

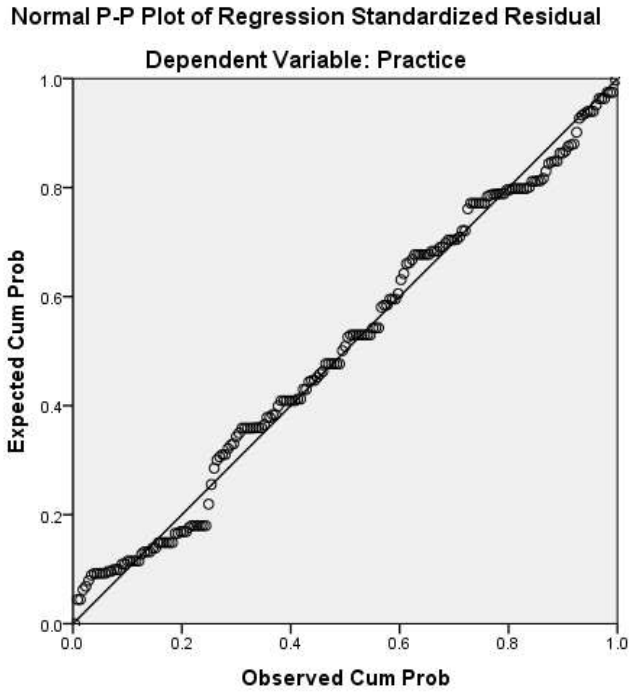
Source: ***Survey Result, 2020***

In addition, Malhotra and Birks (2007) propose that normal probability plots are often conducted as an informal means of assessing the non-normality of a set of data. Hair et al. (1998) also explain that the plots are different from residuals plots in that the standardized residuals are compared with the normal distribution. In general, the normal distribution makes a straight diagonal line, and the plotted residuals are compared with the diagonal. If a distribution is normal, the residual line will closely follow the diagonal (Hair et al., 1998). The following graphs show that the P-P plots are following a straight line which justifies the residuals was deemed to have a reasonably normal distribution, as suggested by Hair et al. (1998).



Source: ***Survey Result, 2020***

Figure 4.3: Normality plot of regression standardized residual for Model 1



Source: ***Survey Result, 2020***

Figure 4.4: Normality plot of regression standardized residual for model 2

4.7 Multiple Regression Analysis

According to Marczyk et al. (2005) linear regression is a method of estimating or predicting a value on some dependent variables given the values of one or more independent variables. Like correlations, statistical regression examines the association or relationship between variables. Unlike with correlations, however, the primary purpose of regression is prediction.

Multiple R is a correlation between the observed values of y, the values of y predicted by multiple regression models. Therefore, large values of the multiple R represent a large correlation between the predicted and observed values of the outcome. Adjusted R square was used to measure the percentage of variance in the dependent variable explained by the independent variables. From the multiple regression equation, the standard regression coefficient (beta weight) was determined to compare the effect of each independent variable had on the variability of the overall purchase decision.

The model summary tables show the strength of relationship between the independent and the dependent variable. Based on Table 4.9 and 4.10 model summary results, when perception of generic medicine and practice with generic medicine were regressed on, except cost all independent variables, contribute to statistically significant relationship ($p< 0.01$) between the dependent variables.

The coefficient of determination R^2 is a measure of how good a prediction of the criterion variable we can make by knowing the predictor variables. Accordingly, 87.4% for perception and 78.7% for practice of the variation accounted for the dependent variable is due to the combined effect of the mentioned independent variables. But, sometimes R^2 tends to somewhat over-estimate the success of the model when applied to real world. Therefore, to see the success of our model in the real world, adjusted R^2 is more preferable than R^2. Therefore; the variation explained by the regression of all the predictor variables is 87% for perception and 78.1% for practice.

Table 4.9: Model Summary for model 1

Model Summary[a]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.935[a]	.874	.870	.178

a. Predictors: (Constant), Safety, Cost, Quality, Knowledge , Efficacy

b. Dependent Variable: Perception

Source: ***Survey Result, 2020***

Table 4.10: Model Summary for model 2

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.887[a]	.787	.781	.191

a. Predictors: (Constant), Safety, Cost, Quality, Knowledge , Efficacy

b. Dependent Variable: Practice

Source: ***Survey Result, 2020***

On regression result the beta values tell us about the relationship between perception towards generic medicines and each predictor. When the value is positive we can tell that there is positive relationship between predictor and the outcome, whereas a negative coefficient represents negative relationship. Table 4.11 depicted that the standardize beta value for safety of generic medicine is 0.377. This indicates that, this variable has relatively strong degree of importance for physicians' perception towards generic medicine than other predictors. In other words, the effect of quality of generic medicines is greater than that of knowledge, cost and efficacy and safety of generic medicines. Except cost the p value of all independent variables is less than .01. This indicates that there is a strong positive and significant relationship between the independent

variables and dependent variable. Cost of generic medicine has positive relationship with perception towards generic medicines. The significance level of the predictor is .945 which is greater than 0.05. Cost of generic medicine is statistically insignificant at less than five percent. This indicates there is positive and statistically insignificant relationship between cost of generic medicines and physicians' perception of generic medicine.

Table 4.11: Regression Analysis of Independent and Dependent Variable for model 1

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.668	.146		-4.571	.000
	Knowledge	.445	.043	.350	10.372	.000
	Cost	.002	.027	.002	.069	.945
	Quality	.251	.022	.377	11.693	.000
	Efficacy	.087	.034	.091	2.576	.011
	Safety	.371	.037	.360	9.981	.000

a. Dependent Variable: Perception

Source: ***Survey Result, 2020***

Table 4.12 depicted that, knowledge about generic medicine has standardized beta value of 0.435. This indicates that, this variable has relatively strong degree of importance for prescription of generic medicine than other predictors. In other words, the effect of knowledge about generic medicines is greater than that of, cost and quality, efficacy and safety of generic medicines. Among technical factors safety has standardized beta value of 0.36. This indicates that, this variable has relatively strong degree of importance for prescription of generic medicine than quality and efficacy. Except cost the p value of all independent variables is less than .01. This indicates that there is a strong positive and statistically significant relationship between the independent variables and dependent variable. Cost of generic medicine has negative relationship with generic prescription with standardized beta value of -0.055. The significance

level of the predictor is 0.173 which is greater than 0.05. Cost of generic medicine is not statistically significant at less than five percent. This indicates there is not statistically significant relationship between cost and generic medicine prescription.

Table 4.12: Regression Analysis of Independent and Dependent Variable for model 2

Coefficients[b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.571	.157		3.647	.000
	Knowledge	.457	.046	.435	9.939	.000
	Cost	-.040	.029	-.055	-1.368	.173
	Quality	.118	.023	.214	5.099	.000
	Efficacy	.108	.036	.138	2.997	.003
	Safety	.306	.040	.360	7.674	.000

a. Dependent Variable: Practice

Source: S*urvey Result (March, 2020)*

4.7.1 Analysis of Variance

ANOVA table 4.13 & 4.14 shows that the combination of variables significantly predicts the dependent variable. ANOVA tests whether the model is significantly better at predicting the outcome than using the mean as a best guess; specifically, the F-ratio represents the ratio of the improvements in prediction that results from fitting the model, relative to the inaccuracy that still exists in the model. For these data, F values are 261.768 and 139.625, which are significant at $p<0.001$. This result tells us there is less than a 0.1% chance that an F-ratio is larger would happen by chance alone. Therefore, it implies that the regression model results in significantly better prediction of perception towards generic medicine and practice with generic medicine than if we used the mean value of perception towards generic medicine.

Table 4.13: ANOVA for model 1

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	41.650	5	8.330	261.768	.000[b]
	Residual	6.014	189	.032		
	Total	47.664	194			

a. Dependent Variable: Perception

b. Predictors: (Constant), Safety, Cost, Quality, Knowledge , Efficacy

Source: ***Survey Result, 2020***

Table 4.14: ANOVA for model 2

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.527	5	5.105	139.625	.000[b]
	Residual	6.911	189	.037		
	Total	32.437	194			

a. Dependent Variable: Practice

b. Predictors: (Constant), Safety, Cost, Quality, Knowledge , Efficacy

Source: ***Survey Result, 2020***

4.8 Model testing

The objective of the regression in this study is to find such an equation that could be used to find the impact of predictors on dependent variable. The specified regression equation takes the following form:

Equation; Model 1: $Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \varepsilon$

$$Y = -0.668 + 0\ .002\ X1 + 0.360\ X2 + 0.091X3 + 0.377X4 + 0\ .350X5$$

$$Y = 0.002\ X1 + 0.36X2 + 0.091X3 + 0.377X4 + 0.35X5 - 0.668$$

Where Y= Perception towards generic medicines

X1=Cost of generic medicine, X2= Safety of generic medicine, X3=Efficacy of generic medicine, X4=Quality of generic medicine, X5= Knowledge of generic medicine

The regression coefficient result of physicians knowledge of generic medicine was indicated as β= 0.350, P<0.01 as Sig.000 (Table 4.11)**.** The P value is <0.01 indicating a statistically significant relationship between physicians knowledge of generic medicine and physicians' perception towards generic medicines at 1% significance level. The coefficient of 0.35 indicating that, a unit increase of physicians' knowledge of generic medicine would result in to an increase in physicians' perception towards generic medicines by 35% assumed all other variables are being constant. Physicians' knowledge of generic medicine has positive and statistically significant effect on physicians' perception towards generic medicines.

The regression coefficient result of efficacy of generic medicine was indicated as β= 0.091, P<0.05 as Sig.011 (table 4.11). The P value is <0.05 indicating a statistically significant relationship between efficacy of generic medicine and physicians' perception towards generic medicines at 5% significance level. Efficacy of generic medicine had a coefficient 0.091, which implies that 9.1% of increase in physicians' perception towards generic medicine is due to a unit change in efficacy of generic medicine, assumed all other variables are being constant. Which entails that efficacy of generic medicine has positive and statistically significant effect on physicians' perception towards generic medicines.

The regression coefficient result of safety of generic medicine was indicated as β= 0.360, P<0.01 as Sig.000 (table 4.11). The P value is <0.01 indicating a statistically significant relationship between safety of generic medicine and physicians' perception towards generic medicines at 1% significance level. The coefficient 0.36 infers that, a unit increase of safety of generic medicine would result 36% of increase physicians' perception towards generic medicine, assumed all other variables are being constant. Safety of generic medicine has positive and statistically significant effect on physicians' perception towards generic medicines.

The regression coefficient result of quality of generic medicine was indicated as β= 0.377, P<0.01 as Sig.000 (table 4.11).The P value is <0.01 indicating a statistically significant relationship between quality of generic medicine and physicians' perception towards generic medicines at 1% significance level. The coefficient 0.377 infers that, a unit increase of safety of generic medicine would result in to an increase in physicians' perception towards generic medicines by 37.7%, assumed all other variables are being constant. Quality of generic medicine

has positive and statistically significant effect on physicians' perception towards generic medicines.

The regression coefficient result of cost of generic medicine was indicated as β= .002, P>0.05 as Sig .945 (table 4.11). The P value is >0.05 entails that cost of generic medicine has a statistically insignificant effect on physicians' perception towards generic medicines at 5% significance level. Cost of generic medicine has positive and statistically insignificant effect on physicians' perception towards generic medicines. Therefore, the model 1 is accepted. Cost has opposite result from our mode however, it is insignificant and not affect model as significant dependent variables.

Table 4.15: Results of the Model 1

Model 1	**Findings/ Results**	**Implications**
knowledge of generic medicine has positive effect on physicians' perception towards generic medicines	β= 0.350, P=0.000<0.01 hence significant	A unit increase in knowledge of generic medicine leads to 0.0.35 increase in physicians' perception towards generic medicine
efficacy of generic medicine has positive effect on physicians' perception towards generic medicines	β= 0.091, P=0.011<0.05 hence significant	A unit increase in efficacy of generic medicine leads to0.091 increase in physicians' perception towards generic medicine
Safety of generic medicine has positive effect on physicians' perception towards generic medicines	β= 0.360, P=0.000<0.01 hence significant	A unit increase in Safety of generic medicine leads to 0.36 increase in physicians' perception towards generic medicine
Quality of generic medicine has positive effect on physicians' perception towards generic medicines	β= 0.377, P=0.000<0. 01 hence significant	A unit increase in quality of generic medicine leads to 0.377 increase in physicians' perception towards generic medicine
cost of generic medicine has negative effect on physicians' perception towards generic medicines	β= .002, P 0.945>0.05 hence insignificant	The cost of generic medicine leads to an increase of 0.002 in physicians' perception towards generic medicine which is insignificant

Survey Result, 2020

Equation; Model 2: $Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \varepsilon$

$$Y = 0.571 - 0.055X1 + 0.36X2 + 0.138X3 + 0.214X4 + 0.435X5$$

Where Y is the Practice of generic medicines Prescription

X1=Cost of generic medicine, X2= Safety of generic medicine, X3=Efficacy of generic medicine, X4=Quality of generic medicine, X5= Knowledge of generic medicine

Testing models with Regression analysis

In this study the regression coefficient result of physicians' knowledge about generic medicines was indicated as $\beta = 0.435$, $P<0.01$ as Sig .000 (table 4.12). The P value is <0.01 indicating a statistically significant relationship between physicians knowledge of generic medicine and physicians' generic prescription at 1% significance level. The coefficient of 0.435 indicating that, a unit increase of physicians' knowledge of generic medicine would result in to an increase in and physicians' generic prescription by 43.5%, assumed all other variables are being constant, which entails that involvement physicians knowledge of generic medicine has positive and statistically significant effect on and physicians' generic prescription.

In this study the regression coefficient result of efficacy of generic medicine was indicated as $\beta = 0.138$, $P<0.01$ as Sig.003 (table 4.12)**.** The P value is <0.01 indicating a statistically significant relationship between efficacy of generic medicine and physicians' generic prescription at 1% significance level. Efficacy of generic medicine had a coefficient of 0.138 implies that 13.8% of increase in physicians' generic prescription is due to a unit change in efficacy of generic medicine, assumed all other variables are being constant. Efficacy of generic medicine has positive and statistically significant effect on physicians' generic prescription.

The regression coefficient result of safety of generic medicine was indicated as $\beta = .360$, $P<0.01$ as Sig.000 (table 4.12). The P value is <0.01 indicating a statistically significant relationship between safety of generic medicine and physicians' generic prescription at 1% significance level. The coefficient 0.36 infers that, a unit increase of safety of generic medicine would result 36% of increase physicians' generic prescription, assumed all other variables are being constant. Safety of generic medicine has positive and statistically significant effect on physicians' generic prescription.

The regression coefficient result of quality of generic medicine was indicated as β= 0 .214, P<0.01 as Sig.000 (table 4.12)**.** The P value is <0.01 indicating a statistically significant relationship between quality of generic medicine and physicians' generic prescription at 1% significance level. The coefficient 0.214 infers that, a unit increase of quality of generic medicine would result in to an increase in physicians' generic prescription by 21.4%, assumed all other variables are being constant. Quality of generic medicine has positive and statistically significant effect on physicians' generic prescription,

The regression coefficient result of cost of generic medicine was indicated as (β= -0.055, P>0.05 as Sig.173; table 4.12). The P value is >0.05 entails that involvement cost of generic medicine has negative and statistically insignificant effect at 5% significance level and a coefficient -0.055 infers that cost of generic medicine has negative effect on physicians' generic prescription cost of generic medicine has negative and statistically insignificant effect on physicians' generic prescription, therefore, the model 2 is accepted.

Table 4.16: Results of the Model 2

Model 1	**Findings/ Results**	**Implications**
knowledge of generic medicine has positive effect on physicians' generic prescription	β= 0.435, P=0.000<0.01 hence significant	A unit increase in knowledge of generic medicine leads to 0.435 increase in physicians' generic prescription
efficacy of generic medicine has positive effect on physicians' generic prescription	β= 0.138, P=0.003<0.05 hence significant	A unit increase in efficacy of generic medicine leads to 0.138 increase in physicians' generic prescription.
Safety of generic medicine has positive effect physicians' generic prescription	β= 0.360 P=0.000<0.01 hence significant	A unit increase in Safety of generic medicine leads to 0.36 increase in physicians' generic prescription.
Quality of generic medicine has positive effect on physicians' generic prescription	β= 0 .214, P=0.000<0.01 hence significant	A unit increase in quality of generic medicine leads to 0.214 increase in physicians' generic prescription
cost of generic medicine has negative effect on physicians' generic prescription	β= -0.055, P=0.173>0.05 hence insignificant	The cost of generic medicine leads to in decrease of 0.055 in physicians' generic prescription. which is insignificant

Survey Result, 2020

4.9 Discussion of the Findings

This study was designed and carried out in order to identify factors influencing the Perception of physicians towards generic medicines prescription in Addis Ababa private hospitals. The specific objectives were to examine evaluate physicians' understanding of the concept of generic medicines, to assess the perception of physicians toward generic medications and to investigate factors that influence physicians in prescribing generic medicines. The study, as a result, found that the significant numbers of physicians have not positive perception towards generic medicines and prescription of generic prescription was based on many factors.

While assessing physicians' knowledge about generic medicines, it was observed that most of the physicians had good knowledge about them. Regarding the understanding of physicians towards generic medicines, the findings were consistent with other published studies. Our findings revealed that majority (83.6%) of physicians knew that generic medicines are copy and interchangeable with brand name medicines, This result is supported by the a study published in the India, almost similar number (76.5%) of physicians knew that generic drug can be used in place of innovator drug (Tandel et al., 2018). In this study more than three fourth (81%) said generic medicine have the same active substance to brand medicines. While, in India, the finding was 61.8% that is almost comparable result with this study finding. Paradoxically, in Mekelle more than half of the doctors said generic medicines have different active ingredients than a brand innovator (Workneh et al., 2017). More than half (62.1%) of physicians had the knowledge of generic medicines must be in the dose and same dosage. Similar findings have been obtained from other researches: studies in Sudan and Nigeria said almost similar. Seventy percent of physicians in Sudan and 64.9% of physicians in Nigeria knew that generic medicines must be in the dose and same dosage form as its' corresponding brand name medicine (Fadare et al., 2016 and Esraa & Mohamed, 2020). Likewise a study that was conducted by Chua et al. (2010) found almost equal number of physicians (65.5%) knew that generic medicines must be in the dose and same dosage form as its' corresponding brand name medicine. In this study, only 56.9 % of physicians knew generic medicines were available in the market of Ethiopia. Similar study in Mekelle city, Ethiopia almost finds the same. The study said 63.2% of physicians knew availability of generic medicines in Ethiopia market (Gebrekirstos et al, 2016). However, higher

number of physicians in Sudan (76.4 %) knew their availability in Sudan market (Esraa & Mohamed, 2020).

Regarding the affordability of generic medicines, our study reveals that majority (85.1%) of physicians said generic medicines are more affordable than innovator medicines. This result is supported by the studies of Shukla et al. (2013) and Esraa & Mohamed (2020) which were conducted in India and Sudan respectively founds 82.6% and 81.9% of doctors said generic medicines are more affordable than innovator medicines. In this study more than half (65.1% and 64.5%) of physicians stated generic medicines could reduce the cost of treatment and have the potential to reduce the price of other brand medicines. Almost similar number (60 % and 68 % respectively) of Iranian and Swedish physicians said too (Yousefi et al., 2015 and Anderson et al., 2015). A study by Kendall & Schoner (1991) stated that there is no question that generic medicines can reduce cost of medications. Almost half of physicians said generic medicines were cheaper and gave health care savings while maintaining standard of health care service. Haas et al. (2005) found the same result and concluded that use of generic medicine result in important health care savings in the United States while maintaining quality of care.

Regarding the quality of generic medicines, significant number of the doctors were found to have a greater doubt in generic drugs as pointed out in this study less than half of physicals generic medicines are as good quality as brand name medicines, their quality control is similar, bioequivalent and conduct PV, While more than half (54.3%) said they are manufactured according to GMP guidelines. Our finding was similar to published studies; in Tanzania half of all medical practitioners indicated that the generic drugs have satisfactory quality as originators (Kamuhabwa & Kisoma, 2015). Shrank et al. (2011) review 32 studies and found more than half of doctors were concerned about the quality of generic medicines, which are consistent with our finding. Hassali et al. (2008) stated that 32.2% of physicians said generic drug products are not adequately tested that is less than our finding. One study in Sudan found almost similar result like our study, 58.3% of doctors said generic drugs manufactured are following good GMP guidelines as multinationals (Esraa & Mohamed, 2020). Studies in different countries found 49.4%, 35.6% and72% of the physicals said that generic medicines are bioequivalent to brand name medicines. Our finding was similar to and lowers than this published study (Chua et al., 2010, Hassali et al., 2008 and Tandel et al., 2018).

In this study almost half physicians expressed concern about the efficacy of generic medicines. Half of respondents agreed that generic medicines are therapeutically equivalent to Brand name medicines and have similar PK and PD. whereas less than half of physicians agreed that generic medicines provide identical clinical effects and have similar bio-availability variability as brand medicines. Finding similar to those of our study were obtained in studies in different developing and Europe countries such as in Nigeria, Greece and France (Theodorou et al., 2014, Fadare et al., 2016 and Lagarceet al., 2005). The above studies stated that almost half (50.8%, 51.25% and 53.5% respectively) of physicians said that generic medicines have similar efficacy, therapeutically equivalent and bio-availability variability to brand name medicines.

Our study found that more than half of physicians said that generic medicines were safe as, had side effect, ADR and induce medicine-related mortality similar to brand name medicines. Almost similar findings were found by Singh et al. (2015) and Laurence et al. (2005); they said 49% and 55% of physicians said generic medicines were similar to brand medicines in all safety, ADR and drug induced mortality respectively.

From the respondents, more than three fourth of physicians believed generic medicines contributed to cost-effective management of disease and could improve access to medications. Similar number of physicians (87.8% and 81.9% respectively) from Pakistan and Sudan believed that generic medicines are more affordable than brand name medicines (Hassan & Khan, 2017 and Esraa & Mohamed, 2020). In this study significant number (65.6% &59%) of physicians believed generic medicines were only meant for poor and made with lower quality therapeutic substances respectively. This result is consistent with studies done in Bosnia, Nigeria and USA. They found 60%, 47.1% and 50% of doctors were believed that generic medicines were made with lower quality substance and had lower quality than those produced by innovator pharmaceutical companies respectively (Čatić et al., 2017, Fadare et al., 2016 and Shrank et al 2011). This study found that more than half of physicians said generic medicines were for poor's. Studies by Chua et al. (2010) and Jamshed et al. (2012) founds more than half of physicians believe that generic medicines were for poor's that have low socio economic status. This concurs with our findings.

Fifty five percent of our physicians believed generic medicines don't offer the same and take longer time to give response as the originators. This finding was within the range of 79% to 25%

revealed elsewhere in the literature (Yousefi et al., 2015, Chua et al., 2010 and Colgan et al., 2015). Our study revealed that half of physicians believed there was lack of quality check and post market surveillance in generic medicines compared to the originators and lead to more side effects and ADR than brand name medicines respectively. While, in Flood et al. (2017) study, the findings were almost similar to our finding, 55% of physicians had perception of generic medicines by mentioning that generic medicines were not adequately manufactured and not had good quality control that leads to more side effects and ADR than brand name medicines.

Half of physicians felt safe while prescribing brand medicines. This finding was within the range findings from Ghana, Korea, Bangladesh and Yemen. They found 39.5%, 50.6%, 66% and 60.8% of physicians prescribed brand medicines and they also felt safe of prescribing them respectively (Afriyie et al., 2014, Ryu & Kim, 2017, Hossain et al., 2013 and Al-Shami et al., 2015). Less than half (40.5%) of physicians preferred to prescribe brand medicines for only complicated conditions while 49.2% preferred to prescribe generic medicines for less serious diseases. This result is consistent with studies done in Malaysia and Nigeria. Almost half of physicians from both countries said they would use generic medicines for mild conditions and brand medicines for serious conditions (Al-Gedadi et al., 2008 and Fadare et al., 2016).

This study founds almost half of physicians will switched to the generic alternative, if generic alternative for branded medicines were available and do not support the use of brand name medicines. This finding is consistent with the findings of other researchers in different areas. Tandel et al. (2018) founds half of prescribers did not prescribe innovator drugs when generic alternative were available. Similarly Iranian physicians do not support the use of brand name medicines, with 50 % preferring to prescribe generics when equivalent alternatives are available (Yousefi et al., 2015).

This study founds less than half (43.1%) of physicians were pressured to request more frequent follow-up visits and for additional examinations while prescribing generic medicines. Similar results have been obtained from other study by Alghasham et al. (2009); he found 40% of physicians frequently felt pressured to prescribe generic drugs. In our study more than quarter of physicians said generic medicines will discriminate their patients according to their OOP capability to purchase originals. Whereas half of them said generic medicines will facilitate their patients' compliance. This supports the finding from the literatures studied elsewhere; more than

three fourth of the respondents were also influenced by the socio-economic class of the patients (Fadare et al., 2016) and 61% of doctors considered that generic medicines would discriminate their patients according to their out-of-pocket capability to purchase original drugs (Labiris et al., 2015). The same picture applies in relation to patient insurance coverage, where about 69.97% and 64.77% of physicians take it into account when prescribing brand or generic medicines in Greece and Cyprus, respectively (Theodorou et al., 2014). All the above listed studies stated that generic medicines facilitated patient compliance and prescription refill. Our study finds only 43% of physicians had a good practical experience with generic medicines. Consistent findings were found by Ryu & Kim (2017); half of physicians said they had personal experience with the generic medicines.

This study found that physicians' knowledge of generic medicines has effect on physicians' perception towards generic medicines and has positive and significant effect on physicians' perception towards generic medicines (β= 0.350, P=0.000; Table 4.11). Similar results have been obtained from other researches: Babar et al., (2011) in his study in Auckland, indicated that those with better knowledge were more likely to use generic medicines. Another study by Yousif et al. (2016) founds standardized β =0.22 and p <0.05, which indicates physicians' knowledge of generic medicine had positive and significant effect on physicians' perception towards generic medicines.

Previous studied were investigated and the factors affecting the physicians' perception towards generic medicines was tried to be determined. In the studies, it was determined that different factors association with physicians' perception towards generic medicines, and the factors were found to be generic medicines efficacy, safety and quality. The regression coefficient result of efficacy of generic medicine was indicated as (β= 0.091, P=0.011; table 4.11), safety of generic medicine was indicated as (β= 0.360, P=0.000; table 4.11), and quality of generic medicine was indicated as (β= 0.377, P=0.000; **t**able 4.11); which entails that involvement efficacy, safety and quality of generic medicine has positive and significant effect on physicians' perception towards generic medicines.

Over all significant associations and positive correlation was found between physicians' perception towards generic medicines with generic medicines efficacy, safety and quality. The findings are in accordance with the result of Theodorou et al. (2009) conduct a study in Greece

and Cyprus found that coefficient of efficacy (β =0.200, P=0.000), safety (β=0.395, p=0.000) and quality (β =0.477, p=0.000); which implies that efficacy, safety and quality of generic medicines has positive and significant effect on physicians' perception towards generic medicines. Quality is the most important factor considered in generic medicine perception. Similar studies by Chua et al .(2010), Hossain et al. (2013) and Elpiniki et al. (2013) conducted in different developing countries, Europe and Asia concluded that there were many factors under the technical factors that affect the perception of physicians towards generic medicines. It was observed that among the most emphasized factors were the generic medicines efficacy, quality, and safety.

In our study the regression coefficient result of cost of generic medicine was indicated as (β= .002, P=0.945; table 4.11); which entails that involvement physicians cost of generic medicine has positive and insignificant effect on physicians' perception towards generic medicines; Similarly Leweket al. (2015) conducted a study in Italy, indicated that moderate and positive association was found between the physicians perception towards generic medicines with the cost of generics medicines (P>0.05, 95% C.I). Inconsistent results are found elsewhere by Abulhaj et al. (2013) with regression coefficient cost of generic medicine as β value of 0.147, P value of 0.012 and Adjusted R^2 value of 0.318. Positive and significant association was found between physicians' perception towards generic medicines and the cost of generics medicines. However, our model explained better than his model, in our study the variation explained by the regression of all the predictor variables is 87% (Adjusted R^2 =0.87; table 4.19) while his model explained only 31.8% of physicians perception variation.

The research was designed essentially to capture the perception that physicians' towards generic medicine and their prescription of generic medicines. Cost is as a determining factor in choice of generic medicine and physicians more likely to use generics because of the cost of the medicine. However, in this study cost was not seen as a determining factor in physicians' choice of generic medicine. This study revealed that involvement cost of generic medicine has negative and insignificant effect on physicians' generic prescription (β= -0.055, P=0.173; table 4.12).The finding is in accordance with the result of Aldin et al. (2018) conduct a study in Iran and found that the price involvement has a negative effect on physicians' choice of a generic medicine (β= -0.214, p=.190 and 95%). He concluded, low involvement in price is negatively related to the physicians' choice of generic medicines. Whereas Chew et al. (2000) found negative and

significant association with standardized coefficient of -0.12 and P value of 0.01, which is inconsistent with our finding.

Safety is one of those variables that have been written extensively as determining factor for physicians to prescribe medicines. In this study safety was seen as a determining factor in physicians' choice of generic medicine and has positive and significant effect on physicians' generic prescription (β= 0.360, P=0. 000; table 4.12)**.**This finding mirrors that of Erah et al. (2013); study conducted in Southern Nigeria found that safety of generic medicine had positive and significant with standardized coefficient of 0.39 at a confidence interval of 95% and P values less than or equal to 0.05. Similarly Schumock et al. (2004) also found positive and significant effect of safety of generic medicine on physicians' generic prescription (β= .15, P<0.05 and Adjusted R square 0.68). Almost our model (Adjusted R^2 =0.781; table 4.10) and his model (Adjusted R^2 =0.68) equally explained the variation of physicians' generic prescription. Studies in different countries showed that safety of the generic medicine is responsible for physicians' prescribing behavior of generic medicines and it is the most influential factor among medicine related factors (Billa et al., 2017).

Efficacy of any medicine is a clear indication of the effectiveness of that medicine. In this study efficacy was seen as a determining factor in physicians' choice of generic medicine and has positive and significant effect on physicians' generic prescription (β= 0.138, P=0.003; table 4.12)**.** This concurs with the findings of Kisoma et al. (2015) in private health facilities of Dares Salaam, Tanzania, found positive coefficient of efficacy of generic medicine with p value <0.05, P= 0.000 and Shafi (2014); at 5% significance level, this study concludes that efficacy of generic medicine influence GPs to prescribe them. The above studies in different countries founds that efficacy of generic medicines had a meaningful, significant and positive relationship with doctors' generic medicines prescription choice. Physician will firstly take the product efficacy in to account in order to prescribe a generic medicine (Aldin et al., 2018).

The quality of any medicine is a clear indication of the standard of that medicines and this is enforce and monitored by the relevant institutions tasked with this responsibility. In our study Quality was seen as a determining factor in physicians' choice of generic medicine and has positive and significant effect on physicians' generic prescription (β= 0 .214, P=0.000; table 4.12). The importance of quality generic medicines in physicians' generic prescription choice has

been described in different studies: Shamim-ul-Haq et al. (2014) found the standardized β value of quality of generic medicine was 0.186 and P value of <0-05. A study by Shetti & Sumana (2015) said, it is observed that regression coefficient value of quality of generic medicine was 0.25, at 95 % confidence interval and the p value is 0.000 which is less than 0.05. Like our study the above studies showed an association of quality generic medicines has positive and significant relationship with and physicians' prescription choice. There was no difference between public hospital and private hospital physicians in considering the quality and therapeutic value of generic drugs while they plan to prescribe medicines (Algashem, 2009).

Regarding factors affecting physicians' prescription choice of generic medicines, our study investigated that physicians' knowledge about generic drugs has have a meaningful relationship with doctors' prescription habits and has positive and significant effect on physicians' generic prescription (β= .435, P=0.000; table 4.12). The importance of physicians' knowledge of generic medicine in their prescription habit has been described in different countries and studies: Akici et al. (2013) found that physicians' knowledge of generic medicine has positive effect on physicians' generic prescription with P value <0.05 and Kisa (2006) in turkey showed positive association of physicians' knowledge of generic medicines, with their prescription choice (β= 0.375, P<0.05). The above studies revealed that physicians' knowledge of generic medicine has positive and significant effect on physicians' generic prescription which is similar with our finding.

As a conclusion, physicians' knowledge about generic medicines and products' related factors, such as safety, efficacy, and quality of generic medicines were evaluated to have a meaningful and positive relationship with doctors' prescription choice. Our conclusion concedes with Waheed et al. (2011) and Narendran & Narendranathan (2013) studies. Their studies support our research findings that physicians' generic medicines knowledge, generic medicines quality, efficacy and safety were responsible for physicians' prescription choice.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter deals with summary, conclusion and recommendations of the research. In this chapter first, the findings which is made from chapter four is summarized, conclusions of the major findings are drawn, then some possible recommendations are forwarded on the basis of the major findings of the study.

5.1 Summary of Major Findings

This study was designed and carried out in order to identify factors influencing the perception of physicians towards generic medicines prescription in Addis Ababa private hospitals. The specific objectives were to examine physicians' understanding of the concept of generic medicines, to assess the perception of physicians toward generic medications and to investigate factors that influence physicians in prescribing generic medicines.

While assessing physicians' knowledge about generic medicines, it was observed that most of the physicians had good knowledge about them. The majority strongly agree/agree that generic medicines are copy and interchangeable with brand name medicines and also knew that they have the same active substance, be in the same dosage. However, only half of knew generic medicines are available in the market of Ethiopia.

Regarding perception of physicians towards generic medicines; More than three fourth of physicians believed generic medicines contributed to cost-effective management of disease and could improve access to medications. However, significant number of physicians believed generic medicines were only meant for poor, made with lower quality therapeutic substances, leads to more side effects and don't offer the same and take longer time to give response as the originators. Almost half of physicians believed treatment failure was the main concern and their potency was questionable.

Half of physicians felt safe while prescribing brand medicines and will switched to the generic alternative, if generic alternative for branded medicines were available. They preferred to prescribe brand medicines for only complicated conditions while generic medicines for less serious diseases. Significant number of physician's generic medicines will facilitate their

patients' compliance even though, they discriminate their patients according to their out-of-pocket capability to purchase originators. Finally only less than half of physicians had a good practical experience with generic medicines.

Reliability test was done and Cronbach alpha values were checked to assure the internal consistency of the research instrument. As a result, the overall Cronbach alpha value was 0.879 which indicates that there is high internal consistency of measurement scales.

Regarding correlation result, Pearson correlation coefficient was computed for all variables and it shows that except cost all independent variables are significantly and positively correlated with both dependent variables. Cost has positive and moderate correlation with both physicians perception of generic medicine and generic medicines prescription. Among independent variables, Knowledge about generic medicines ($r=0.720$, $p<.01$), and safety of generic medicines ($r=0.749$, $p<.01$) have higher values of correlation coefficient than others. This indicates that those variables have highly influences physicians perception of generic medicines. Quality of generic medicines, ($r=0.752$, $p<.01$) and safety of generic medicines ($r=0.793$, $p<.01$) have higher values of correlation coefficient than others. This indicates that physicians were highly considered about quality and safety of generic medicines of while they decided to prescribe generic medicines.

From regression result, the standardize beta value for knowledge, safety and efficacy and quality of generic medicines were positive and the p value of all the above variables is less than .01. This indicates that there is a strong positive and statistically significant relationship between these independent variables with both dependent variables. Even though, cost of generic medicine has positive relationship with perception towards generic medicines, it is not statistically significant (P- value 0.945). Cost of generic medicine has negative relationship with generic prescription and have significance level of the predictor is it is not significant (P- value 0.173). Finally, 87% for perception and 78.1% for practice of the variation accounted for the dependent variables were due to the combined effect of the overall the independent variables.

5.2 Conclusion

Generic medicines provide cost-effective alternatives to branded medicines, resulting in considerable savings to healthcare budgets. However, if physicians are poorly understood about their equivalence to branded medication, it is highly unlikely that generic medicines will be preferred over their branded equivalents. Generally our study finds that majority of physicians had good knowledge generic medicines. However, there were gaps on the efficacy, quality and safety of generics medicines. In addition there were gap on difference of generics and brands.

This study has also identified that a significant proportion of physicians do not have positive perceptions of generic medicines. The majority of the physicians from private hospitals of Addis Ababa had concerns about safety, quality and the efficacy of generic medicines. Not having positive perceptions could be the cause of the limited use of generic medicines in the private medical centers.

The majority of the physicians from private hospitals of Addis Ababa who participated in this survey indicated a low generic medicine prescription rate. They preferred to use originator drug products and write their prescriptions using brand names. The study findings showed that several factors influenced prescribing decision with regard to the generic medicines including knowledge about generic medicines quality, safety and efficacy of generic medicines. It was observed that the most influential factors affecting the physicians' choices were knowledge about generic medicine followed by safety then by quality and finally efficacy of the generic medicines. However, low involvement in price of generic medicines in the physicians' choice of generic medicines was revealed. Physicians give more weight on drug related factors than cost of generic medicines while they prescribe them. Physician believes that a high degree of safety, quality and efficacy are more important than low costs, the latter aspects have little influence on their choice.

There is clearly a need for interventions aimed at private hospital physicians to target misperceptions of inferior quality, safety and efficacy as well as to explain the reasons why generic medicines are cheaper than brand-name equivalents, the meaning of bioequivalence, and the testing and regulatory processes involved in approving a generic medicine for general use.

5.3 Recommendation

The prescribing of good quality generic medicines saves considerable resources for patients and health care systems without compromising care. This is especially important in Ethiopia where the healthcare sector is underfunded and there are considerable out-of-pocket payments. In this study majority of physicians had good knowledge about generic medicines. However, there were gaps on the efficacy, quality and safety of generic medicines. Their knowledge about generic medicines similarity with brand medicines in terms quality, safety and efficacy is a prerequisite for better acceptance and prescription of them. It is evident in the literature that knowledge gap of generic medicines is a barrier to generic medicines prescription. Strategies that focus on the dissemination of knowledge lead to changes in the physicians' knowledge about generic medicines will be important tool to fill the gap. Interventions need to cover all aspects of generic medicines, including their availability, equivalence with original brands in terms of active ingredient, quality, safety, effectiveness, and bioequivalence.

This study identified that a significant proportion of physicians do not have positive perceptions and had concerns about safety, quality and the efficacy of generic medicines. These negative perceptions could be the cause of the limited use of generic medicines in the private hospitals. Physicians, who are more concern about the safety of the medicines, are less likely to prescribe generic medicines. The opposite conclusion is also possible which states that physicians who are concerned about the safety of medicine are more likely to prescribe branded medicines. There is clearly a need for interventions aimed at physicians to target their belief of inferior quality, safety and efficacy as well as to explain the reasons why generic medicines are cheaper than brand-name equivalents, the meaning of bioequivalence, and the testing and regulatory processes involved in approving a generic medicine for general use. Clearly, this involves having an effective regulatory system (and an effective enforcement of anti-counterfeiting policies). Assured quality, efficacy and safety of generic medicines is the pre-condition for all measures to take effect.

Finally this study indicated a low generic medicine prescription rate. It requested the support of government to improve the utilization of generic medicines and more scientific evidence about the safety and efficacy of generic medicines will improve generic prescribing. There is a range of

policy options to encourage physicians to prescribe generic medicines. They range from encouraging to making mandatory the prescribing of the generic medicines.

In order to eliminate this knowledge gap, concerns on quality, safety and efficacy of generic medicines and low generic prescription rate there should be full cooperation between governments, educators, professional organizations and regulatory authorities. Based on this study finding we recommend to each concerned bodies as follow:

- Standard treatment guideline should be developed by EFDA on generic and brand dispensing and prescribing. Regulation to permit or mandate the prescribing of generic medicines the like government hospitals. Exceptions will be typically made in certain cases to prescribed branded product with clear exemption rules and documentation. This will promote uptake of generic medicines in the private health care system.
- EFDA should permit generic substitution that allows pharmacists to dispense therapeutically interchangeable generic medicines rather than originator products. This will be one policy options to promote the prescribing of generic medicines.
- EFDA have to assured the quality, efficacy and quality of generic medicines starting from pre-marketing assessment and evaluation of the quality, safety and efficacy of generic medicine, including compliance of manufacturing processes with GMP standards, and as well as post-marketing surveillance activities. This will eliminate physicians concern over generic medicines and increases the confidence of prescribers.
- Continuous education should be given by MOH and other stakeholders to fill the gap in knowledge and perception of the pharmacological properties and differences of brand and generic medicines. Training will increase the prescribers' familiarity (knowledge) with generic medicines and their prescription too.
- Educators should fill the knowledge gap, avoid negative perception and improve generic medicine prescription; through teaching the concepts and values of generic medicines and disseminating knowledge on the standards required to manufacture generic medicines.
- Professional association should involve in awareness creating activities that seemed to be necessary to fill the gap in knowledge and perception of physicians.

REFERENCE

Abulhaj, E., Elsamen, A., & Alabbadi, I. (2013). Investigating the factors affecting doctor's prescribing behavior in Jordan: Anti-hypertensive drugs as an example. *European Journal of Social Sciences,* 28(2), 380-391.

Afriyie, D.K., Amponsah, S.K., Antwi, R., Nyoagbe S.Y., & Bugyei K.A. (2015). The prescribing trend of antimalarial drugs at the Ghana Police Hospital. *J Infect Dev Ctries*, 9, 409–415.

Akici, A., Kalaça, S., Gören, M.Z., Akkan, G., Karaalp, A., & Demir, D. (2004). Comparison of rational pharmacotherapy decision-making competence of general practitioners with intern doctors. *Eur. J. Clin. Pharmacol*, 60, 75-82.

Aldin, S.H., Mohammadzadeha, M., Salamzadehc, J., Abolfazlia, S.A., Zalid A., & Khoshdele, A.R. (2018). Main Factors Affecting Physicians' Prescribing Decisions: The Iranian Experience. *Iranian Journal of Pharmaceutical Research*, 17 (3), 1105-1115.

Al-Gedadi, N.A., Hassali, M.A., & Shafie, A.A. (2008). A pilot survey on perceptions and knowledge of generic medicines among consumers in Penang, Malaysia. *Pharm Pract*, 6(2), 93–97.

Alghasham, A.A. (2009). Generic drug prescribing in central Saudi Arabia: perceptions and attitudes of physicians. *Annals of Saudi Medicine*, 29(1), 24–29.

Al-Shami, A.M., Izham, M.I., & Abdo-Rabbo, A. (2015). Evaluation of the quality of prescriptions with antibiotics in the government hospitals of Yemen. *J Clin Diagn Res*, 5, 808–812.

Babar, Z.D., Grover, P., Stewart, J., Hogg, M., Short,L., Seo, H.G., & Rew, A. (2011). Evaluating Pharmacists' knowledge and perception regarding generic medicines in New Zealand. *Research in social and administrative pharmacy*, 7, 294-305.

Bhattacherjee, A. (2012). *Social science research: principles, methods, and practices* (2nd ed.). A free textbook published under the Creative Commons Attribution 3.0 License. The Global Text Project is funded by the Jacobs Foundation, Zurich, Switzerland.

Bloom, B.S., Wierz, D.J., & Pauly, M.V. (1986). Cost and Price of Comparable Branded and Generic Pharmaceuticals. *Journal of the American Medical Association*, 256(18), 2523–2530.

Buusman, A., Andersen, M., Merrild, C., & Elverdam, B. (2007). Factors influencing GPs' choice between drugs in a therapeutic drug group; A qualitative study. *Scandinavian Journal of Primary Health Care*, 25(4), 208-213.

Cameron, A., Ewen, M., Ross, D., Ball, D., & Laing, R. (2011). Medicine prices, availability and affordability in 36 developing and middle-income countries: A secondary analysis. *Lancet*, 373, 240–249.

Cameron, A., Mantel-Teeuwisse, A.K., Leufkens, H.M., & Laing, R.O. (2012). Switching from originator brand medicines to generic equivalents in selected developing countries: how much could be saved? *Value Health*, 15, 664–673.

Čatić, T., Avdagić, L., & Martinović, I. (2017). Knowledge and attitudes of physicians and pharmacists towards the use of generic medicines in Bosnia and Herzegovina. *Medicins kiglasnik Zenica*, 14(1).

Chalachew, A., Geoff, M., Jane, N., Aseffa, A., & Clavarino, A. (2018). Views and perceptions about locally manufactured medicines in Ethiopia: a qualitative study of physicians, patients and regulatory authorities. *BMC Health Services Research*, 18, 624.

Chew, L.D., Theresa, S., Young, O., Bradley, K.A., Maynard, C., & Lessler, D.S. (2000). A physician survey of the effect of drug sample availability on physicians' behavior. *J. Gen. Intern. Med*, 15, 478-489.

Chong C.P., Hassali M.A., Bahari M.B., & Bahari, M.B. (2010). Evaluating community pharmacists' perceptions of future generic substitution policy implementation: a national survey from Malaysia. *Health Policy*. 94, 68–75.

Chua, G.N., Hassali, M.A., Shafie, A.A., Shafie, A.A., & Awaisu, A. (2010). A survey exploring knowledge and perceptions of general practitioners towards the use of generic medicines in the northern state of Malaysia. *Health Policy*, 95, 229-235.

Cohen, J., Belova, A., Selmaj, K., Wolf, H., Sormani, M.P., and Oberyé, J. (2015). Equivalence of Generic Glatiramer Acetate in Multiple Sclerosis A Randomized Clinical Trial. *JAMA Neurol*, 72(12), 1433-1441.

Cohen-Kohler, J.C. (2007). The morally uncomfortable global drug gap. *Nature*, 82, 610-614.

Colgan, S., Faasse, K., Martin, L.R., Stephens, M.H., Grey, A., & Petrie, K.J. (2015). Perceptions of generic medication in the general population, doctors and pharmacists: a systematic review. *British medical journal*, 5:e008915.

Corrao, G., Davide, S., Carlo, L.V., Catapano, A., & Agabiti-Rosei,E. (2014). Medication persistence and the use of generic and brand-name blood pressure-lowering agents. *Journal of Hypertension*, 32 (5), 1146-1153.

Denig, P. (1994). Drug choice in medical practice: rationales, routines and remedies. s.n.

Desai, R.J., Sarpatwari, A., Dejene, S., Khan, N.F., Lii, J., & Rogers, J.R. (2019). Comparative effectiveness of generic and brand-name medication use: A database study of US health insurance claims. *PLoS Med*, 16(3): e1002763.

Dunne, S., Shannon, B., Dunne, C., & Cullen, W. (2014). A review of the differences and similarities between generic drugs and their originator counterparts, including economic benefits associated with usage of generic medicines, using Iran**.** *BMC Pharmacol. Toxicol*, 14 (2013), 1.

El-Dahiyat, F., Kayyali, R., & Bidgood, P. (2014). Physicians' perception of generic and electronic prescribing: A descriptive study from Jordan. *Journal of Pharmaceutical Policy and Practice*, 7, 7.

Elpiniki, F., Eirini, C.V., Dimitra, S.P., Saridi, D., Maria, R., & Souliotis, K. (2013). Knowledge and attitudes of Greek physicians towards generic prescribing after the economic crisis. *International Journal of Pharma Sciences and Research*, 4(10), 125-133.

Erah, P., Olumide, G.O., & Okhamafe, A. (2003). Prescribing practices in two health care facilities in Warri, Southern Nigeria: A comparative study. *Tropical Journal of Pharmaceutical Research*, 2(1), 175-182.

Esraa, A.O., and Mohamed, A.M. (2020). Perception and attitude of General Practitioners toward local generic medicines in Sudan: A hospital-based study. *Res Pharm HealtSci*, 6(1):108-114.

Fabiano, V., Mameli, C., Cattaneo, D., Mele, G., Clementi, E., Zuccotti, G.V. (2012). Perceptions and patterns of use of generic drugs among Italian family pediatricians: first round results of a web survey. *Health Policy*, 104(3), 247–252.

Fadare, J.O., Adeoti, A.O., Desalu, O.O., Enwere, O.O., Makusidi, A.M., Ogunleye O., & Sunmonu, T.A. (2015). The prescribing of generic medicines in Nigeria: knowledge, perceptions and attitudes of physicians. *Expert Review of Pharmaco -economics & Outcomes Research,* DOI:10.1586/14737167.2016.1120673

Farhat, F., Othman, A., Karak, F., & Kattan, J. Review and results of a survey about biosimilars prescription and challenges in the Middle East and North Africa region. *SpringerPlus* 5, 211.

Figueiras, M.J., Marcelino, D., & Cortes, M.A. (2008). People's views on the level of agreement of generic medicines for different illnesses. *Pharmacy World & Science*, 30, 590–594.

Flood, D., Mathieu, I., Garcia, P., & Rohloff, P. (2017). Perceptions and utilization of generic medicines in Guatemala: a mixed-methods study with physicians and pharmacy staff. *BMC Health Serv. Res*, 17 (1), 27.

FMOH/WHO. (2005). *Survey on prices of medicines in Ethiopia*.Retrieved fromapps.who.int/ medicine docs/ documents/s16554e/s16551e.pdf. (Accessed on April, 2020).

FMOH/WHO. (2007). *Drug financing in Ethiopia*. Retrieved from apps.who.int/medicinedocs/ en/m/abstract /s16551e/s16551e.pdf.(Accessed on April, 2020).

Food and Drug Administration. (2001*). Guidance for Industry: Statistical Approaches to Establishing Bioequivalence*. Retrieved from www.fda.gov/downloads/Drugs/ Guidance Compliance Regulatory Information/Guidances/UCM070244.pdf(Accessed on April, 2020).

Gebresillassie, B.M., Belachew, S.A., Tefera, Y.G., Abebe, T.B., Mekuria, A.B., and Haile, K.T. (2018). Evaluating patients', physicians' and pharmacy professionals' perception and concern regarding generic medicines in Gondar town, northwest Ethiopia: A multi-stakeholder, cross-sectional Survey. *PLoS ONE*, 13(11).

Getachew, H., Ebrahim, D.O., & Derbew F.B. (2018). Original Article Generic medicine perception among physicians and pharmacists: a myth that harms the poor. A qualitative study in Addis Ababa, Ethiopia. *Sudan Medical Journal,* 54(3), 200-208.

Godman, B., Bishop, I., Campbell, S.M., & Malmström, R.E. (2015). Quality and efficiency of statin prescribing across countries with a special focus on South Africa; findings and future implications. *Expert Review of Pharmacoeconomics & Outcomes Research* 15(2), 323-330.

Gönül, F.F., & Carter, F.J. (2012). Estimation of promotional strategies for newer vs older drugs based on physician prescribing data. *International Journal of Pharmaceutical and Healthcare Marketing*, 6(1), 39-54.

Gonzalez, J., Sismeiro, C., Dutta, S., & Stern, P. (2008). Can branded drugs benefit from generic entry? The role of detailing and price in switching to non-bioequivalent molecules. *International Journal of Research in Marketing*, 25(4), 247-260.

Gossell-Williams, M. (2007). Generic Substitutions: A 2005 Survey of the Acceptance and Perceptions of Physicians in Jamaica. *West Indian Medical journal,* 56 (5): 2

Gupta, R., Malhotra, A., and Malhotra, P.A. (2018). Study on assessment of awareness on generic drugs among doctors in a tertiary care teaching hospital in north India. *International Journal of Research in Medical Sciences*, 6(4), 1362-1367.

Hair, J.F., Anderson, R.E., Tatham, R.L., & Black, W.C. (1998). *Multivariate data analysis* (5th ed.). Englewood Cliffs, NJ: Prentice Hall inc.

Hallersten, A., Fürst, W., & Mezzasalma, R. (2016). Physicians prefer greater detail in the biosimilar label (SmPC) – Results of a survey across seven European countries. *Regulatory Toxicology and Pharmacology,* 77, 275-281.

Hassali, M.A., Kong, D.C., and Stewart, K. (2006). Generic medicines: perceptions of general practitioners in Melbourne, Australia. *Journal of Generic Medicines*, 3(3), 214–225.

Hassan, I., & Khan, A. (2017). Perception of physicians towards the side effects of the both generic and brand name medicines in Islamabad, Pakistan. *International Journal of Collaborative Research on Internal Medicine & Public Health*, 9 (5.)

Hayelom, G., Abadi, K., and Gebremedhin, G. (2016). Assessment of knowledge, attitude and practice of pharmacists and physicians toward generic medicine use in private clinics anddispensary of Mekelle city, northern Ethiopia. *Ejpmr, 3(7), 114-121.*

Hellerstein, J.K. (1998). The importance of the physician in the generic versus trade-name prescription decision. *Rand Journal of Economics*, 29 (1), 108 – 136.

Himmel, W., Simmenroth-Nayda, A., & Niebling, W. (2005). What do primary care patients think about generic drugs? *International Journal of Clinical Pharmacology and Therapeutics*, 43, 472–9.

Ho, R. (2006). *Handbook of Univariate and Multivariate Data Analysis and Interpretation with SPSS.*New York: Taylor & Francis Group.

Homedes, N., and Ugalde, A. (2005). Multisource drug policies in Latin America: survey of 10 countries. *Bulletin of the World Health Organization*, 83(1), 64–70.

Hossain, M., Kawsar, S., Tanmy, T., & Ledig, T. (2013). Assesment of influencing factors on prescription practices of physicians in Bangladesh. *International Research Journal of Pharmacy*, 4(8), 112-116.

ICH, (1994). The International Conference on Harmonization of Pharmaceutical Regulations, the European Medicines Evaluation Agency and the FDA (Article 10). *Indiana Journal of Global Legal Studies*, 4(1).

Jamshed, S.Q., Ibrahim, M.M., Hassali, M.A., Masood, M., Low, B.Y., Shafi, A.A., & Babar Z. (2012). Perception and attitude of general practitioners regarding generic medicines in Karachi, Pakistan: A questionnaire based study. *Southern Med Review,* 5(1), 22-30.

Joyce, G., Carrera, M., Goldman, D., & Sood, N. (2011). Physician Prescribing Behavior and Its Impact on Patient-Level Outcomes. *American Journal of Managed Care***,** 17(12).

Kamuhabwa, A., & Kisoma, S. (2015). Factors influencing prescribing practices of medical practitioners in public and private health facilities in Dares Salaam, Tanzania. *Tropical Journal of Pharmaceutical Research*, 14(11), 2107-2113.

Kasmer, R.J., Nara, A.R., Green, J.A., Chawla, A.K., & Fleming, G.M. (1987). Comparable steady-state bioavailability between two preparations of conventional-release procainamide hydrochloride. *Drug Intell Clin Pharm,* 21,183–186.

Keenum, A.J., DeVoe, J.E., Chisolm, D.J., & Wallace, L.S. (2003). Generic medications for you, but brand-name medications for me. *Res Social Adm Pharm*, 8(6), 574-578.

Kendall, K.W., & Schoner, B. (1991). Consumer Response to Generic/Chemically Equivalent Drugs. *Journal of Public Policy & Marketing,* 10 (2), 182-201.

Kersnik, J., & Peklar, J. (2006). Attitudes of Slovene general practitioners towards generic drug prescribing and comparison with international studies. *Journal of clinical pharmacy and therapeutics,* 31, 577-583.

Kesselheim, A.S., Misono, A.S., Lee, J.L., Stedman, M.R., Brookhart, M.A., Choudhry, N.K., & Shrank W.H. (2008). Clinical Equivalence of Generic and Brand-Name Drugs Used in Cardiovascular Disease: A Systematic Review and Meta-analysis. *Journal of the American Medical Association*, 300(21), 2514–2526.

King, D.R., & Kanavos, P. (2002). Encouraging the Use of Generic Medicines: Implications for Transition Economies. *Croat Medical Journal*, 43, 462-469.

Kisa, S. (2006). Factors that influence prescribing decisions among Turkish physicians. *Clinical Research and Regulatory Affairs*, 23(3), 177-189.

Kothari, C.R. (2004). *Research Methodology Methods & Techniques* (2nd ed.). New Delhi: New Age International Publisher

Kotler, P., & Armstrong, G. (2006). *Principles of marketing* (11th ed.). Upper Saddle River: New Jersey: Prentice-Hall.

Krejcie, R.V., & Morgan, D.W. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, 30(3), 607-610.

Labiris, G., Fanariotis, M., Kastanioti, C., & Fanariotis, M. (2015). Greek Physicians' Perceptions on Generic Drugs in the Era of Austerity. *Hindawi Publishing Corporation Scientifica*, 2015, 9.

Lagarce, L., Lusson-Brisset, C., Bruhat, C., Diquet, B., & Lainé-Cessac, P. (2005). How Practitioners View Generic Drugs: An Opinion Study from General Practitioners in Maine-et-Loire (France). *Thérapie*, 60 (1), 67-74.

Lewek, P., Smigielski, J., & Bosn P.K. (2015). Factors affecting the opinions of family physicians regarding generic drugs – a questionnaire based study. *J Basic Med Sci*, 15(1), 45-50.

López-Valcárcel, B.G., Librero, J., Sanfélix-Gimeno, G., and Peiró, S. (2011). Are prescribing doctors sensitive to the price that their patients have to pay in the Spanish National Health System? *BioMed Central Health Services Research***,** 11: 333.

Malhotra, N.K., & Birks, D.F. (2007). *Marketing Research: An Applied Approach* (3rd Ed.). England: Prentice Hall, Inc., a Pearson Education company. Management, Vol XI No. MB.

Marczyk, G., DeMatteo, D., & Festinger, D. (2005). *Essentials of Research Design and Methodology*. Published by John Wiley & Sons, Inc., Hoboken, New Jersey, Published simultaneously in Canada.

Mohamed, A.H., Asrul, A.S., & Ahmed, A. (2010). Physicians' Views on Generic Medicines: A Narrative Review. *Journal of Generic Medicines*, 7, 3-39.

Moss, G., & Schilling, I. (2003). Brand logic for Pharma? A possible strategy based on FMCG experience. *International Journal of Medical Marketing*, 44.

Narendran, R., & Narendranathan, M. (2013). Influence of pharmaceutical marketing on prescription practices of physicians. *Faculty of Business - Papers (Archive).* 27.

Nightingale, S.L. (1998). From the Food and Drug Administration. *Journal of the American Medical Association*, 279, 645.

O'Rourke, A. (2006). ACC/AHA 2006 Guidelines for the Management of Patients WithValvular Heart Disease. *Journal of the American College of Cardiology*, 48(3), 1-148.

Pallant, J. (2001). *SPSS Survival Manual; A step by step guide to data analysis*. (Version 10).Buckingham, Philadelphia. www.openup.co.uk/spss

Paraponaris, A., Verger, P., Ventelou, B., Pulcini, C., & Pauvif, L. (2012). Perceptions and attitudes of French general practitioners towards rapid antigen diagnostic tests in acute pharyngitis using a randomized case vignette study. *Journal of Antimicrobial Chemotherapy*, 67(6), 1540–1546.

Ryu, M., & Kim, J. (2017). Perception and attitude of Korean physicians towards generic drugs. *BMC Health Services Research*, 17,610.

Sajbel, T.A., Carter, G.W., & Wiley, R.B. (2001). Converting patients from brand-name clozapine togeneric clozapine. *Annals Pharmacotherapy*, 35, 281-284.

Salhia, H.O., Naser, A.A., & Metwally, R.A. (2015). Perception and attitude of physicians toward local generic medicines in Saudi Arabia: A questionnaire-based study. *Saudi Pharmaceutical Journal*, 23(4), 397-404.

Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research Methods for Business Students* (5th ed.). Harlow, England: Pearson Education Limited.

Schumock, G., Walton, S., & Park, H. (2004). Factors that influence prescribing decisions. *The Annals of Pharmacotherapy*, 38, 557-562.

Sewell, K., Andreae, S., Luke, E., & Safford, M.M. (2012). Perceptions of and Barriers to Use of Generic Medications in a Rural African American Population, Alabama. *Prevent Chronic Diseases*, 9, 120010.

Shafi, V. (2014). Prescribing behavior of physicians in Karachi, Pakistan. *World Journal of Pharmaceutical Research*, 3(3), 3528-3536.

Sharrad, A.K., Hassali, M.A., & Shafie, A.A. (2009). Generic medicines: Perception of Physicians in Basrah, Iraq. *Australasian Medical Journal*, 1(8), 58-64.

Shetti, S.A., & Sumana, M.H. (2015). Prescription analysis of drugs used in outpatient department of dermatology at tertiary care hospital. *Asian Journal of Biomedical and Pharmaceutical Sciences*, 5(46), 13-15.

Shrank, W.H., Liberman, J.N., Fischer M.A., Girdish, C., Brennan, T.C., & Choudhry, N.K. (2011). Physician perceptions about generic drugs. *Annals of Pharmacotherapy*, 45(1), 31–38.

Shukla, M., Ahire, K., Gattani, M., Pradhan, T., Pal, A., & Roy R.K. (2013). A survey based study in current scenario of generic and branded medicines. *International Journal of Pharmacy and Pharmaceutical Sciences*, 5(3). ISSN- 0975-1491

Spurling, G.K., Mansfield, P.R., & Montgomery, B.D. (2010). Information from Pharmaceutical Companies and the Quality, Quantity, and Cost of Physicians' Prescribing: A Systematic Review. *PLoS Med*, 7(10), e1000352.

Strom, B.L., Stolley, P.D., & Brown, T.C. (1974). Drug anti substitution studies I: estimation of possible savings by repeal of anti-substitution laws. *DRUGS HLTH CARE*, *1*(2), 99-103.

Tan, N.C., Tay, I.H., Ngoh, A., & Tan, M. (2009). A qualitative study of factors influencing family physicians' prescription of the Written Asthma Action Plan in primary care in Singapore. *Singapore Medical journal,* 50 (2), 161.

Tandel, K.R., Patel, N.M., Zaiwal, S.M., Chavda, N.B., and Dhanan, J.V. (2018). A study of knowledge, attitude, and practice on generic drugs among teaching faculties at a tertiary care teaching hospital in South Gujarat, India. *National Journal of Physiology, Pharmacy and Pharmacology*, 8 (6), 810-816.

The Global Use of Medicines. (2015). *Outlook through Report by the IMS Institute for Healthcare Informatics*. Retrieved from: http://www.imshealth.com/deployedfiles/ims/ Content/Global_Use_of_Medicines_Report.pdf (Accessed on July 2020)

Tichelaar, J., Richir, M.C., Avis, H.J., Scholten, H. J., Antonini, N. F., & Vries, G. M. (2010). Do medical students copy the drug treatment choices of their teachers or do they think for themselves? *European Journal of Clinical Pharmacology* , 66, 407–412

Tolla, M.T., Norheim, O.F., Verguet,S., Bekele,A., Amenu, K., and Abdisa, S.G. (2017). Out-of-pocket expenditures for prevention and treatment of cardiovascular disease in general and specialized cardiac hospitals in Addis Ababa, Ethiopia: a cross-sectional cohort study. *British Medical Journal Global Health*, 2, e000280

Tsiantou, V., Zavras, D., Kousoulakou, H.M., Geitona, M., & Kyriopoulos, J. (2009). Generic medicines: Greek physicians' perceptions and prescribing practices. *Journal of Clinical Pharmacy and Therapeutics*, 34, 547–554.

U.S. Food and Drug Administration. (2019). *Abbreviated New Drug Application (ANDA): Generics, United Nation Statistics Division, World Statistics Pocketbook*. Retrieved from http://data.UN.org/ country profile/Ethiopia. (Accessed on June 2020.)

Waheed, K.A., Jaleel, M., & Laeequddin, M. (2011). Prescription loyalty behavior of physicians: an empirical study in India. *International Journal of Pharmaceutical and Heathcare Marketing*, 5 (4), 279-298.

Wazana, A. (2000). Physicians and the Pharmaceutical Industry is a Gift Ever Just a Gift? *Journal of the American Medical Association*, 283(3), 373-380.

Wieringa, J.E., Nannan, P.V., Gans, R.O., Degener, J.E., Laseur, M., & Haaijer-Ruskamp, F.M. (2006). Improving compliance with hospital antibiotic guidelines: a time-series intervention analysis. *Journal of Antimicrobial Chemotherapy*, 55(4), 550–557.

William, H.S., Joshua, N.L., & Michael, A.F. (2011). Physician Perceptions about Generic Drugs. *Annal Pharmacotherapy*; 45, 31-38.

Workneh, B.D., Kassa, T.T., Dinkashe, F.T., & Aregawi, S. (2017). Factors affecting physician's adherence to generic drug prescribing practice in private health facilities, Mekelle city, northeastern Ethiopia. *JDDT*, 7(2), 44-49.

World Health Organization. (1997). *Quality assurance of pharmaceuticals: a compendium of guidelines and related materials: Volume 1. Geneva.* Retrieved from https://www.who.int/ medicines/areas/quality_safety/quality_assurance/QualityAssurancePharmVol2.pdf (Accessed April 2020).

World Health Organization. (2004). *WHO Medicines Strategy: Countries at the core, 2004–2007. Geneva: World Health Organization.* Retrieved from http://apps.who.int /medicinedocs/ pdf /s5416e/s5416e.pdf.(Accessed April 2020).

World Health Organization and Health Action International. (2008). *Measuring medicine prices, availability, affordability and price components.* Retrieved from http://www .who.int/ medicines /areas/ access /OMS_Medicine_prices.pdf. (Accessed April 2020).

Yard, B. (2017). Assessment of Knowledge, Attitude and Practice of Pharmacy Professionals toward Generic Medicines, Northern Ethiopia, Mekelle: A Cross Sectional Study. *Journal of Basic Clinical Pharmacy*, 8,193-199.

Yousefi, N., Mehralian, G., Peiravian, F., Jahangiri, S., & Ahmadi, R. (2015). Physicians' perceptions of generic medicine in Iran. *Drugs & Therapy Perspectives*, 31(7), 244-250.

Annex 1: Questioner

ADDIS ABABA UNVERSITY

College of Business and Economics

Dear Sir/Madam, The objective of this questionnaire is to gather information regarding physician's perception towards generic medications. The information obtained will be used for research purpose only. As a result, your frank and honest response to each item has practical and valuable significance in the accomplishment of the study. The questionnaire consists of two parts: Background information and perception of physicians‟ towards generic medicines. **Thank you very much for your cooperation and time!**

Part One: Background Information Please make a tick mark **(X)** or fill in the blank space.

1. Sex: Male ☐ Female ☐

2. Age: 21-30 ☐ 31-40 ☐ 41-50 ☐ 51-60 ☐ >60 ☐

3. Marital status: married ☐ single ☐ divorced ☐

4. Specialty:_____

5. Year of Service: ≤5 ☐ 6-10 ☐ 11-15 ☐ ≥ 16 ☐

6. How many patients do you receive, diagnose, or treat per day? _____

7. How many medical representatives visit your office per month? _____

Part Two: knowledge, cost, quality, efficacy, safety, Perception and practice: based on the extent to which an item explains, please respond to all the items in the table by indicating your agreement or disagreement circling the number.

5- Strongly agree, 4- Agree, 3- Neutral, 2- Disagree, and 1- Strongly disagree.

S/N	Items	Strongly agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree(1)
	Part A: Knowledge about Generic Medicines					
K1	Generic medicines are copy and interchangeable with brand name (originator) medicines	5	4	3	2	1
K2	Generic drug approvals must be based on scientific considerations and minimize duplicative testing.	5	4	3	2	1
K3	Generic medicines required to have the same active substance, route of administration and the same intended use of the brand name medicines	5	4	3	2	1
K4	Generic and brand name formulations of the medicines can have some minor differences, such as the inactive ingredients, colour, shape, and product packaging	5	4	3	2	1
K5	Generic medicines must contain the same dose and be in the same dosage form (such as tablet, capsule) as brand name medicines	5	4	3	2	1
K6	Generic medicines are manufactured after the expiration of the patent of the brand name (originator) medicines	5	4	3	2	1
K7	Generic medicines are available in the market of Ethiopia	5	4	3	2	1
	Part B:Cost					
C1	Generic medicines are more affordable than brand name(originator) medicines	5	4	3	2	1
C2	Generic medicines prescription can reduce the cost of treatment than brand name medicines	5	4	3	2	1
C3	Generic medicines have the potential to reduce the price of other brand name medicines by creating more competition	5	4	3	2	1
C4	Generic medicines are cheaper because no extra cost of research and development	5	4	3	2	1
C5	Generic medicines provide health care savings while maintaining standard of health care service.	5	4	3	2	1
	Part C:Quality					
Q1	Generic medicines are as good quality as generic medicines Brand name (originator) medicines	5	4	3	2	1

Q2	Generic companies are following Good Manufacturing Practices (GMP) guidelines as the Originators	5	4	3	2	1
Q3	There is a quality control on generic medicines similar to the Originators	5	4	3	2	1
Q4	Generics are bioequivalent to brand name (originator) medicines	5	4	3	2	1
Q5	Generic companies conduct post market Pharmacovigilance service to assure the quality similar to the Originators	5	4	3	2	1
	Part D:Efficacy					
E1	Generic medicines are therapeutically equivalent to Brand name medicines	5	4	3	2	1
E2	FDA examines generic medicines and approve them as equivalent to brand-name medicines in terms of efficacy	5	4	3	2	1
E3	Generic medicines provide identical desirable clinical effects as brand name medicines give	5	4	3	2	1
E4	The existence of variability inter and intra patients bio-availability of generic medicines are similar to brand name medicines	5	4	3	2	1
E5	Generic medicines have similar Pharmacokinetic and pharmacodynamics propriety to brand name medicines	5	4	3	2	1
	Part E:Safety					
S1	Generic medicines are safe as brand name medicines	5	4	3	2	1
S2	Generic medicines have the same side effects as brand medicines	5	4	3	2	1
S3	Generic medicines produce medicine-induced adverse drug reactions (ADR) similar brand name medicines	5	4	3	2	1
S4	Generic medicines induce medicine-related mortality similar to brand name medicines	5	4	3	2	1
S5	FDA examines generic medicines and approve them as equivalent to brand-name medicines in terms of safety	5	4	3	2	1
	Part F:Perception towards Generic medicines					
P1	I believe Generic medicines contribute to the overall cost-effective management of disease	5	4	3	2	1
P2	I believe Generic medicines can improve access to medications	5	4	3	2	1
P3	I believe Generic medicines are only meant for poor	5	4	3	2	1
P4	I believe Generic medicines don't offer the same and take longer time to give response as the Originators	5	4	3	2	1
P5	I believe there is lack of quality check and post market surveillance in Generic medicines compared to the Originators	5	4	3	2	1
P6	I believe Generic medicines use different inactive ingredients, introducing the potential to compromise their quality	5	4	3	2	1
P7	I believe Treatment failure is the main concern about generic medicines	5	4	3	2	1
P8	I believe Generic medicines Potency is questionable	5	4	3	2	1
P9	I believe Generic medicines are made with lower quality therapeutic	5	4	3	2	1

	substances.					
P10	I believe Generic medicines lead to more side effects and ADR than brand name medicines	5	4	3	2	1
	Part G: Practical Reason for prescribing generic medicines					
PR1	I feel safe while prescribing brand medicines	5	4	3	2	1
PR2	Patients prefer to be prescribed a brand drug~~:~~	5	4	3	2	1
PR3	I prefer to prescribe Brand medicines for only complicated conditions and Chronic diseases	5	4	3	2	1
PR4	I prefer to prescribe Generic medicines for less serious diseases.	5	4	3	2	1
PR5	If Generic alternative for Branded medicines were available, I will switch to the Generic alternative.	5	4	3	2	1
PR6	I feel pressured to request more frequent follow-up visits and for additional examinations when prescribing generic medicines.	5	4	3	2	1
PR7	I feel Generic medicines will discriminate my patients according to their out-of-pocket capability to purchase originals	5	4	3	2	1
PR8	I feel Generic medicines will facilitate my patients' compliance.	5	4	3	2	1
PR9	I have a good practical experience with generic medicines	5	4	3	2	1

Annex 2: Physicians' response to five point likert scale questions

Part A: Knowledge about Generic Medicines	SA (%)	A (%)	N (%)	D (%)	SD (%)
Generic medicines are copy and interchangeable with originator	31.3	52.3	5.6	7.7	3.1
Generic drug approvals must be based on scientific considerations and minimize duplicative testing.	33.8	44.6	12.3	6.7	2.6
Generic medicines required to have the same active substance, route of administration and the same intended use of the originator	31.3	49.7	11.8	5.6	1.3
Generic and brand name formulations of the medicines can have some minor differences	24.1	49.2	15.4	8.2	3.1
Generic medicines must contain the same dose and be in the same dosage form as brand name medicines	11.8	50.3	18.5	17.9	1.5
Generic medicines are manufactured after the expiration of the patent of the brand name medicines	12.5	39.5	30.3	16.4	1.5
Generic medicines are available in the market of Ethiopia	25.6	30.3	29.2	10.8	4.1
Part B: Cost					
Generic medicines are more affordable than brand name medicines	33.3	51.8	11.3	3.1	0.5
Generic medicines prescription can reduce the cost of treatment than brand name medicines	19.5	45.6	10.8	16.9	7.2
Generic medicines have the potential to reduce the price of other brand name medicines by creating more competition	15.9	44.6	9.2	20	10.3
Generic medicines are cheaper because no extra cost of research and development	18.5	35.9	11.3	23.1	11.3
Generic medicines provide health care savings while maintaining standard of health care service.	14.4	34.9	20	22.1	8.7
Part C: Quality					
Generic medicines are as good quality as originator	9.7	30.3	34.9	23.6	1.5
Generic companies are following GMP guidelines as the originators	21	33.3.	22.6	20	3.1
There is a quality control on generic medicines similar to the Originators	12.3	33.3	25.1	23.1	6.2
Generics are bioequivalent to brand name medicines	9.2	33.3	28.2	24.1	5.1

Generic companies conduct post market Pharmacovigilance service to assure the quality similar to the originators	8.2	32.3	29.7	24.6	5.1
Part D: Efficacy					
Generic medicines are therapeutically equivalent to originators	15.4	35.4	20.5	19.5	9.2
FDA examines generic medicines and approve them as equivalent to brand-name medicines in terms of efficacy	12.8	42.1	22.6	19.5	3.1
Generic medicines provide identical desirable clinical effects as brand name medicines	7.2	41	28.2	22.1	1.5
The existence of variability inter and intra patients bio-availability of generic medicines are similar to brand name medicines	10.8	37.9	29.7	20.5	1
Generic medicines have similar PK and PD propriety to brand name medicines	13.3	36.4	26.2	16.9	7.2
Part E: Safety					
Generic medicines are safe as brand name medicines	12.3	42.1	24.6	16.9	4.1
Generic medicines have the same side effects as brand medicines	21	33.3	21.5	22.1	2.1
Generic medicines produce medicine-induced ADR similar brand name medicines	14.9	32.3	34.4	17.4	1
Generic medicines induce medicine-related mortality similar to brand name medicines	14.4	37.9	26.7	19	2.1
FDA examines generic medicines and approve them as equivalent to brand-name medicines in terms of safety	14.9	35.9	25.1	17.4	6.7
Part F: Perception towards generic medicine					
I believe Generic medicines contribute to the overall cost-effective management of disease	27.7	52.8	8.2	9.2	2.1
I believe Generic medicines can improve access to medications	30.3	50.3	7.2	10.8	1.5
I believe Generic medicines are only meant for poor	24.1	41.5	19	12.3	3.1
I believe Generic medicines don't offer the same and take longer time to give response as the Originators	15.9	39.0	25.6	15.4	4.1
I believe there is lack of quality check and post market surveillance in Generic medicines compared to the Originators	17.4	33.8	26.2	19.0	3.6
I believe Generic medicines use different inactive ingredients, introducing the potential to compromise their quality	6.7	37.4	22.6	25.6	7.7

I believe Treatment failure is the main concern about generic medicines	4.1	30.8	10.3	33.3	21.5
I believe Generic medicines Potency is questionable	7.7	31.3	12.8	32.8	15.4
I believe Generic medicines are made with lower quality therapeutic substances.	9.2	49.7	6.7	21.5	12.8
I believe Generic medicines lead to more side effects and ADR than brand name medicines	10.3	43.1	7.7	30.8	8.2
Part G: Practical Reason for prescribing generic medicines					
I feel safe while prescribing brand medicines	12.3	37.9	12.8	27.7	9.2
Patients prefer to be prescribed a brand drug	7.7	26.7	30.3	32.3	3.1
I prefer to prescribe Brand medicines for only complicated conditions and Chronic diseases	7.7	32.8	25.1	30.3	4.1
I prefer to prescribe Generic medicines for less serious diseases.	8.7	40.5	22.6	22.6	5.6
If Generic alternative for Branded medicines were available, I will switch to the Generic alternative.	7.2	39.5	24.6	22.1	6.7
I feel pressured to request more frequent follow-up visits and for additional examinations when prescribing generic medicines.	6.2	36.9	28.2	22.6	6.2
I feel Generic medicines will discriminate my patients according to their out-of-pocket capability to purchase originals	4.6	29.7	27.2	30.8	7.7
I feel Generic medicines will facilitate my patients' compliance.	13.8	32.8	24.1	27.2	2.1
I have a good practical experience with generic medicines	11.3	31.8	28.2	27.2	1.5

Source: S*urvey Result 2020*