Fall 10-1-2019

Assessing Egyptians' knowledge, perceptions, and attitudes towards generic medicines

Radwa Ahmed Elmoneer
The American University in Cairo

The American University in Cairo
School of Global Affairs and Public Policy

"Assessing Egyptians' Knowledge, Perceptions, and Attitudes towards Generic Medicines"

A Thesis Submitted to the

Public Policy and Administration Department

In partial fulfillment of the requirements for the degree of
Master of Public Policy

By
Radwa Ahmed Mohamed Ahmed Elmoneer

Fall 19

Acknowledgment

First and foremost, I thank God for the love, protection and endurance, his Almighty has provided me over the years.

The writing of this thesis was a journey that was filled with peaks of happiness and troughs of challenges and disappointments. Its completion was only possible with the extraordinary support I received from my family, friends, professors, colleagues, and my boss.

I am grateful to *Dr. Hamid Ali*, the associate professor of Public Policy and Administration, for his support, guidance, and help. It was a great honor and privilege for me to work under his supervision and be one of his students. I would like to express my deep gratitude to *Dr. Laila El Baradei*, the professor of Public Policy and Administration, and *Dr. Nesreen Nasser*, the assistant professor of Public Policy and Administration, for the time they spared reading the thesis, and for their constructive discussions, valuable critiques and insights put into it.

I would also like to express my deepest gratitude to the generous and supportive *Youssef Jameel Public Leadership Program* for their faith in the value of education, and for granting me such invaluable learning experience.

I am highly indebted to my eternal cheerleader and sister *Basma Elmoneer*, my special friends and colleagues *Amany Mahran* and *Passant Elwy*, as well as my sister-friends *Yasmine Sherif* and *Maram Medhat* for their unconditional support and encouragements.

Finally, I must express my very profound gratitude to my lovely parents, my angelic sisters, and the little ones; *Omar*, *Farida*, and *Talida El-Shibely* for their unconditional love, unwavering support and continuous encouragement throughout my years of study and through the process of researching and writing this thesis. This accomplishment would not have been possible without them. Thank you all!

Radwa A. Elmoneer, 2019

"The Future Belongs to those who Believe in the Beauty of their Dreams," & "Prepare for it Today"

(Eleanor Roosevelt) & (Malcolm X)

The American University in Cairo
School of Global Affairs and Public Policy
Department of Public Policy and Administration

ASSESSING EGYPTIANS' KNOWLEDGE, PERCEPTIONS, AND ATTITUDES TOWARDS GENERIC MEDICINES

Radwa Ahmed Mohamed Ahmed Elmoneer

Supervised by Professor Hamid E. Ali

ABSTRACT

Background: Medicines are vital component of any health system worldwide, and ensuring accessibility of affordable, effective and safe medications is a critical public policy goal considered by every country. Egypt has, recently, faced aggravated challenges in ensuring the availability of medications countrywide. In response, the Egyptian government has adopted a number of pharmaceutical policies and interventions, mainly, targeting the ***supply side*** of the market. **Promoting the use of generic medicines** is an effective policy intervention that addresses the ***demand*** *side*, a highly recommended intervention given other countries' experiences. As the main users of medications, patients are a crucial source of knowledge for decision and policymakers. Therefore, prior to implementing any policy intervention to promote the use of generic medicines, it is vital to assess their knowledge and understand their **perspectives** towards generic medicines, as a quality-insured, cost-effective, and therapeutically equivalent alternative.

Methods: The study used a "*Mixed Methods Approach.*" The quantitative part employed an observational cross-sectional study, using a self-developed *questionnaire,* using the main variables in the conceptual framework, and with reference to similar identified studies. The qualitative part was employed, using *interviews*, in two stages; exploratory in the beginning of the research; then, explanatory, afterwards in order to deeply understand the perceptions, views and opinions of pharmacists, physicians, and representatives from the regulatory health authority and pharmaceutical industry.

Results: A total of 601 surveyed participants were included in the study; 390 (65%) 'lay public individuals,' and 211 (35%) 'medical professionals' (pharmacists and physicians). **Knowledge**: Participants showed varied knowledge levels regarding the concept of generic medicines, and its main characteristics. The overall level of correct knowledge of the concept of generic medicines was assessed, on a scale of 10, to be 2.9 for the lay public and 7.5 for the medical professionals. **Perceptions:** participants' opinions and views of generics' effectiveness, safety, quality, and cost were assessed. The overall level of good perceptions of generic medicines averaged 6.16 for the lay public and 6.4 for the medical professionals. **Attitudes:** participants showed varied attitudes towards their acceptability and readiness to use (switch to) a generic medicine, depending on different factors; price, medical condition, the manufacturing status, medical professional, and finally the incurrence of side effects. The overall acceptability to use/switch to a generic averaged 5.7 and 6.5 for the lay public participants and medical professionals, respectively.

Conclusion: Generic medicines can provide substantial savings to the healthcare system and individual patients in Egypt. The present study highlighted a gap in the correct understanding of the concept of generic medicine. Negative perceptions and perceptual barriers are prevalent given the Egyptian context. Although generics are registered via a rigorous scientific based registration system to ensure their effectiveness, safety, quality and bioequivalence, the perception of quality as well as trust in regulatory authority ascertain the need for attention and state interventions. Knowledge emerged as a powerful factor shaping the participants' perceptions towards generics, which in turn, was a significant determinant of the attitudes towards using generic medicines. The findings of the study stress the need to effectively boost the knowledge-based, trustful use and attitudes towards generic medicines, where pharmaceutical and health policy makers should work, jointly, with the different stakeholders in order to promote the use of generic medicines.

Keywords: Pharmaceutical Policy, Medicines, Generic, Patients, Knowledge, Perceptions, Attitudes, Health

Table of Contents:

List of Figures:

List of Tables:

List of Boxes:

List of Abbreviations:

ADRs: Adverse Drug Reactions

APIs: Active Pharmaceutical Ingredients

ATTOGEN: the ATtitude Towards GENerics questionnaire

CAGR: compound annual growth rate

CAPA: Central Administration for Pharmaceutical Affairs

CBE: Central Bank of Egypt

CEO: Chief Executive Officer

CTD: Common Technical Dossier

EDA: Egyptian Drug Authority

EGP: Egyptian Pound

EMA: European Medicines Agency

EPVC: Egyptian Pharmacovigilance Centre

EU: European Union

FDA: Food and Drug Administration

FTAs: Free Trade Agreements

GBD: Global Burden of Disease

GDP: Gross Domestic Product

GDPs: Good Distribution Practices

GMS: Generic Medicines Scale

GP: Generic Prescription

GPs: General Practitioners

GS: Generic Substitution

HCV: Hepatitis C Virus

HICs: High Income Countries

HIO: Health Insurance Organization

HIS: Health Issues Survey

HoldiPharma: Holding Company for Pharmaceuticals, Chemicals and Medical Appliances

HT: Health Technologies

IHME: Institute for Health Metrics and Evaluation

IMF: International Monetary Fund

IPR: Intellectual Property Rights

IRB: Institutional Reveiw Board

ISPOR: The International Society for Pharmacoeconomics and Outcome Research

L-MICs: Lower-Middle Income Countries

MA: Marketing Authorization

MENA: Middle East and North Africa

MICs: Middle Income Countries

MNCs: Multi National Companies/ Corporations

MOHP: Ministry of Health and Population

MPA: Medical Products Agency

NCDs: Non-Communicable Disease, Non-Communicable Diseases

NODCAR: National Organization for Drug Control and Research

NORCB: National Organization for Research and Control of Biologicals

NRAs: National Regulatory Authority/Authorities

NTI: Narrow Therapeutic Index

OECD: Organization for Economic Co-operation and Development

OOP: Out-Of-Pocket

OTC: Over The Counter

PV: Pharmacovigilance

QA: Quality Assurance

QC: Quality Control

R&D: Research and Development

SPSS: Statistical Package for the Social Sciences

TGA: Therapeutic Goods Administration

TRIPS: Trade Related Aspect of Intellectual Property Rights

USA: United States of America

USD: United States Dollar

WTO: World Trade Organization

Chapter One: Introduction

1.1. Background:

The right to health is a fundamental human right that was first articulated in the 1964 Constitution of the World Health Organization (WHO), whose preamble described that "the enjoyment of the highest attainable standard of physical and mental health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition" (OHCHR & WHO, 2008)

Medicines are vital a component of any health system worldwide. Hence, "access to essential medicines is one entitlement of the right to health" (OHCHR & WHO, 2008, P.3). Therefore, ensuring accessibility of affordable, effective and safe medications is a critical public policy goal considered by every country. Moreover, it is a principle that has been echoed in the recently adopted 2030 Agenda for Sustainable Development Goals (SDGs), where the availability, accessibility, acceptability, and affordability of medicines and vaccines of assured quality need to be addressed in order to achieve the SDGs, in particular target 3.8; "achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all." (UNDP, 2015, P.6)

According to the WHO (2018), "some of the greatest challenges to achieving Universal Health Coverage (UHC) stem from persistent barriers to accessing health services and to accessing affordable and quality-assured health products." Therefore, equitable access to health products and medicines became a global priority. Governments pay increasing concerns to provide equitable and improved access to health products and medications among all citizens regardless their age, gender, income level, educational status, geographic location, etc.

However, considerable challenges still exist especially in low and middle income countries whose resources to spend on health and medications are tight, such as Egypt. Moreover, Egypt has faced, recently, an aggravated set of challenges in ensuring the availability of medications in the different healthcare facilities, where a persistent foreign currency exchange shortage, and a subsequent sharp currency devaluation have severely impacted the pharmaceuticals' market leading to severe shortages in the medications countrywide.

On the other hand, pharmaceuticals represent special commodities and the pharmaceutical market is, therefore, a highly regulated market, which hindered the normal adjustment process and mandated the Government of Egypt to adopt and implement a number of pharmaceutical policies and interventions to restore the availability of the different pharmaceutical products and medications, and, thereafter, to enable the pharmaceuticals to sustain their health and economic objectives.

The government and health authority needed to implement a combination of different pharmaceutical policies targeting both the supply and demand sides of the market. However, the different measures implemented so far targeted only the supply side of the market (price increases, accelerating the registration process and allowing more products to the market, closely monitoring and ensuring the supply chain of pharmaceuticals, etc.). Thereafter, it would be highly recommended to start targeting the demand-side, mainly through promoting the use of the therapeutically equivalent and cost-effective generic medications; the use and utilization of which can be significantly promoted leading, eventually, to improved accessibility and affordability of medicinal products in Egypt. The demand side is controlled by three main players; the physician (through prescribing activities), the pharmacist (dispensing and advising), and the patients or medicines' users (purchasing). Nevertheless, patients possess an increasing level of decision making power in the current context of healthcare in general and in Egypt in particular. Apparently, patients or medicine users do not know and/ or do not trust or believe in the latent value and potential of generic medicines.

Therefore, this research explores and assesses the level of understanding of the Egyptians about the concept of generic medicines; their perceptions of its effectiveness, safety, quality, and cost; and extent to which they would be willing to use generic instead of originator branded medicines.

1.2. Context:

Egypt is a lower-middle income country, with a population of 97.55 million, and a Gross Domestic Product (GDP) of 235.37 billion (current US$) in 2017 (World Bank, 2019). The main highlights of the country's health profile and Global Burden of Disease in Egypt (GBD) reflect a high prevalence of the non-communicable diseases (NCDs)[1], where 81.2% of deaths are attributed to NCDs; 9.7% attributed to communicable, maternal, neonatal and nutritional diseases; and 9.1% attributed to injuries and disasters. The prevalence of diabetes and hypertension, for example, stand at 17% and 40% respectively in 2017 (IHME, 2018).

The healthcare system in Egypt has been described to be "fragmented with multiple service providers, with the the Ministry of Health and Population lying at the center as the main service provider" (ISPOR, 2012). Services are delivered through different establishments managed and overseen by the Ministry of Health and Population (MOHP), such as public hospitals, university hospitals and hospitals belonging to the Health Insurance Organization (HIO), which is the public health insurance system. The coverage of HIO, however, is limited to about 58% of the population and covers only employees of the public sector (HIO, 2016), where the main beneficiaries include government employees, retirees, newly-born children, students (school-age and university), unemployed women and widows.

Health services in the governmental facilities, including medicines, are provided either for free or against a small fee. Those who do not have insurance coverage can benefit from the Program for Treatment at the Expense of the State, which was initiated by the government with an independent budget (ISPOR, 2012).

Egypt resources and capabilities to spend on health have been evaluated to be very tight. Table (1) provides an overview of the health expenditure and sources of financing in Egypt compared with the other lower-middle income countries (L-MICs), middle income countries (MICs), high income countries (HICs), the world, the Middle East and North Africa region (MENA), and the average of some selected countries in the MENA region.

[1] NCDS are a wide group of medical conditions, or diseases that are, by definition, non-infectious and non-transmissible among people. They are, also, known as chronic diseases; and tend to be of long duration. The main types of NCDs are cardiovascular diseases (like heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma) and diabetes. (WHO, 2018b)

In 2015, the total health expenditure in Egypt was 4.17% of the GDP, slightly higher than L-MICS (4.05%), and lower than MICs (5.36%), and MENA countries (5.46%) (World Bank, 2019). Government health expenditure comprises 1.25% of GDP in Egypt, slightly lower than the average L-MICs (1.28%); it is significantly lower than that of MENA countries (3%), especially given the Egyptian constitution where Article 18 states that "the state commits to allocate a percentage of government expenditure that is no less than 3% of Gross Domestic Product (GDP) to health. The percentage will gradually increase to reach global rates" (Egypt, 2014).

In most L-MICs and MENA countries there is a significant difference between total and public (government) spending on health. Understandably, the difference is mostly covered through out-of-pocket (OOP)[2] spending. Egypt's government health expenditure comprises only 30% of current health expenditure, whereas private health expenditure comprises 70% of current health expenditure. Nevertheless, the OOP expenditure in Egypt is the highest compared to other benchmarks comprising 62% of the current health expenditure.

Spending on pharmaceuticals constitutes an important feature of the Egyptian context. Generally, spending on pharmaceuticals accounts for about "a fifth of total health care expenditure," (Maniadakis, Kourlaba, Shen, Holtorf & Kalo, 2013, P. 487). However, in Egypt, and according to CAPMAS (2017) "medications were estimated to account for 56% of total healthcare expenditure." Such high percentage of spending on pharmaceuticals can also be seen when benchmarking Egypt against some Middle Eastern countries[(3)]. Egypt has a below average spending on pharmaceuticals as a percentage of GDP (1.3% of the GDP, compared to 1.5%), while it has above average spending on pharmaceuticals as a percentage of total healthcare spending (26% of the spending on health; compared to 25%,).

Table (2) provides an overview of pharmaceuticals spending in Egypt in terms of total spending and as a proportion of GDP and of health expenditure, in comparison to the average and range of some Middle Eastern Countries.

[2] Out-of-pocket spending or payments are the direct payments made by individuals to health care providers at the time of service use (WHO, n.d.)

[3] The countries of: Algeria, Bahrain, Egypt, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, UAE (selected based on data availability and accessibility)

Such high spending on pharmaceuticals, is usually attributed to the high prices of pharmaceuticals in relation to income, especially in the (predominant) private sector; leading to affordability challenges (WHO/HAI, 2004). A recent survey about the prices and affordability of NCD medicines found out that "overall patient prices in private pharmacies were reasonable when compared with international reference prices. However, some individual medicines were very high priced as originator brands and, in some cases, also lowest priced generics. On average originator brands were 80% higher priced than most sold and lowest prices generics." (WHO/HAI, 2014, P. 5)

Pharmaceuticals affordability usually gets manifested into the more challenging access to treatment challenges, where low pharmaceuticals affordability, negatively, impacts access to medication. Based on the Health Issues Survey (HIS) 2015 (MOHP, El-Zanaty & ICF, 2015), it was estimated that "on the national level, 30.8% of NCD patients suffer from 'in-access' to NCDs treatment (3.3% having partial in-access and 27.5% having complete in-access)." Moreover, significant inequalities in accessing NCD treatment were detected among the different social groups, where complete access to NCD treatment is skewed against the poor, young-aged, males and those living outside Urban Governorates. Inequalities in the different socioeconomic factors impacted the inequality in accessing treatment with varying degrees; the main determinant is wealth, responsible for over 90% of the detected inequality; followed by education, age, and type of place of residence (Elmoneer, Shawky & AUC/SRC, 2018).

Table (1): Healthcare Expenditure and Sources of Health Financing

	Current Health Expenditure		Domestic General Government Health Expenditure			Domestic Private Health Expenditure		Out-of- Pocket Expenditure		"External"** Health Expenditure	
	(% of GDP)	Per capita, PPP (current int. $)	(% of GDP)	(% current health expenditure)	Per capita, PPP (current int. $)	(% current health expenditure)	Per capita, PPP (current int. $)	(% current health expenditure)	Per capita, PPP (current int. $)	(% current health expenditure)	Per capit PPP (current int.
Egypt	4.17%	495.17	1.25%	30.08%	148.95	69.66%	344.96	61.96%	306.8	0.25%	1.26
Lower Middle Income Countries	4.05%	259.06	1.28%	31.64%	80.71	64.78%	170.37	57.31%	150.67	3.20%	7.09
Middle Income Countries	5.36%	559.6	2.83%	52.61%	284.18	46.50%	269.57	36.47%	216.2	0.95%	5.72
High Income Countries	12.38%	5,279.91	7.77%	61.22%	3,370.25	38.77%	2,062.12	13.54%	738.57	------	1.13
World	9.89%	1,300.11	5.84%	59.25%	711.39	40.45%	511.73	18.15%	285.65	0.34%	7.24
Middle East and North Africa (MENA)	5.46%	1,056.62	3.11%	59.57%	593.34	40.07%	422.61	30.82%	350.42	------	------
Selected Middle Eastern Countries(*)	5.08%	1,832.82	3.22%	65.29%	1,346.55	35.15%	480.89	32.19%	328.99	0.85%	5.37

Notes: (*) The countries of Algeria, Bahrain, Egypt, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, UAE
(**) Adopted from 2015 National Health Expenditure
PPP= Purchasing Power Parity

S*ource:* World Bank (2019)

Table (2): Spending on Pharmaceuticals; Egypt in comparison to Some Middle Eastern Countries,(*) 2016

	Pharmaceutical Spending (% of GDP)	**Pharmaceutical Spending** (% of health spending)	**Pharmaceutical Spending,** (US$ bn)	**Patented Pharmaceutical Spending** (% total spending)	**Generic Pharmaceutical Spending** (% total spending)	**Prescription Pharmaceutical Spending** (% total spending)	**OTC Pharmaceutical Spending** (% total spending)
Egypt	1.31	25.90	3.54	50.30	32.20	82.50	17.50
Countries' Average	1.50	24.79	2.19	53.46	30.75	84.27	15.77
Countries' Range	0.36 : 3.47	11 : 49.3	0.39 : 7.44	34.5 : 68.6	18.4 : 48.3	70.9 : 89.8	10.2 : 29.1

Notes: (*) The countries of Algeria, Bahrain, Egypt, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, UAE

S*ource*: LSE from market research sources, as Cited in Kanavos et al. (2018)

1.2.1. Pharmaceutical Market in Egypt:

Pharmaceutical Market:

Egypt used to have the largest market of pharmaceuticals among African and Arab countries, according to BSAC (2012), "Egypt has the second largest pharmaceutical market in the Middle East and one of 17 '*pharmerging'* markets worldwide."

In terms of market size, according to 2017 sales, the pharma sales have reached $32 billion across the MENA pharma market, with Saudi Arabia the biggest pharma market in the region at ($7.5bn), Turkey ($6.9bn), Egypt ($3.4bn) and the UAE ($3.17bn) (CPhI, 2018 & PharmExec, 2018).

The pharmaceutical market in Egypt is a very promising market. In 2018, the private market size was estimated to be 67 billion EGP ($3.7 bn), with a 30 percent increase from the previous year. The local industry represented 71% of this value (53% by local Egyptian companies, and 18% by the foreign and multinational companies); imported pharmaceuticals represented the remaining 29% (IMS, n.d.). Table (3) provides an overview of the private pharmaceutical market in Egypt in terms of number of units sold and monetary value during the period from 2013 to 2018.

Table (3): Pharmaceutical Private Market Size, Egypt

	Monetary Value				Unites Sold	
Year	EGP (Billion)	Percent Change	USD[(1)] (Billions)	Percent Change	Units (Billion)	Percent Change
2018	66.62	▲29.11%	3.74	▲29.31%	2.34	▲13.32%
2017	51.60	▲23.97%	2.89	▼30.32%	2.07	▼8.80%
2016	41.62	▲31.27%	4.15	▲0.96%	2.27	▲8.85%
2015	31.71	▲13.30%	4.11	▲4.13%	2.08	▲3.28%
2014	27.98	▲13.99%	3.95	▲10.61%	2.02	▲7.44%
2013	24.55		3.57		1.88	

Notes: [(1)] Calculated using the average USD/EGP exchange rate for each year

Source: IMS Data 2013: 2018

The pharmaceutical market operates via the normal value chain starting from pharmaceutical /medicines suppliers, either manufacturers or importers, then distributors and warehouses, and finally, dispensing to patients and consumers via community pharmacies or private and hospital pharmacies.

Pharmaceutical Industry:

Egypt has the largest pharmaceutical industry based in the Arab and MENA region (AL-Ali, 2002 as cited in Wanis, 2015, P. 61). Its sizeable infrastructure and historical expertise has developed since the late 1930s. Pharmaceutical manufacturing in Egypt is, mainly, based on formulating the imported active pharmaceutical ingredients (APIs) into finished products (dosage forms). Egypt, also, has some local production of APIs but small in terms of capacity and value.

According to the EDA, in 2016, a total of 145 manufacturing company/factory was licensed; 1,103 toll company[4], and 488 pharmaceuticals' importers[5]. Pharmaceutical companies belong to one of three categories; (1) public sector (state-owned) companies, such as those of the Holding Company for Pharmaceuticals, Chemicals and Medical Appliances (HoldiPharma)[6]; (2) local private sector companies; (3) International and Multinational Companies (MNCs).

The Egyptian pharmaceutical industry used to constitute 30 percent of the market supply in the MENA region (BSAC, 2006). The local industry covers around 85 percent of the needs of the Egyptian market, providing affordable medicines to the Egyptians. The remaining 15 percent are imported pharmaceuticals (IMS, 2018).

Storage, Distribution and Dispensing:

The pharmaceuticals supply chain involves a total of eight distribution companies who distribute pharmaceuticals across a geographically dispersed network of 1,977 warehouses, and around 70,000 pharmacies (EDA, 2016). Out of the eight distribution companies, 'Egy-Drug'[7] is a public (state-owned) company. Around 95% of the pharmacies are community pharmacies, and the remaining are either private, hospital, or Egy-Drug pharmacies.

[4] A toll company is a pharmaceutical company that does not have a manufacturing site and manufactures its registered products at others' manufacturing sites.
[5] Excluding importers of Medical Devices, Cosmetics, Veterinary, Pesticides, etc. and other products related to the public health and regulated by the EDA
[6] HoldiPharma operates under the umbrella of the Ministry of Business Sector.
[7] Egy-Drug, the logistic branch of HoldiPharma, owns and operates a number of pharmacies.

Pharmaceuticals:

The number of registered and marketed pharmaceutical products in the Egyptian market averages around 14,000 products. Pharmaceuticals can be classified according to different criteria; originator versus generic, prescription versus OTC, and traditional pharmaceuticals versus biologicals, as follows:

Pharmaceuticals are usually classified as either 'Originators Brand/Innovators' or 'Generics,' where *Originator Brand Medicine* is "the product that was first authorized worldwide for marketing (normally as a patented product) on the basis of the documentation of its efficacy, safety and quality, according to requirements at the time of authorization. The originator product always has a brand name; this name may, however, vary between countries." (WHO/HAI, 2008). *Generic medicine* is "a pharmaceutical product usually intended to be interchangeable with the originator brand product, manufactured without a license from the originator manufacturer and marketed after the expiry of patent or other exclusivity rights" (WHO, 2004), "a generic has the same qualitative and quantitative composition in active substances and the same pharmaceutical form as the reference medicinal product [Originator Brand Medicine], and whose bioequivalence with the reference medicinal product has been demonstrated by appropriate bioavailability studies" (PHIS, 2009). In Egypt, as reflected in table (2), generic medicines constitute only 32.2% of total spending. (Kanavos et al., 2018, P. 10)

Likewise, pharmaceuticals are also classified as either 'Prescription' or 'Over-The-Counter (OTC),' where *Prescription Medicine* is "a medicine supplied only in licensed pharmacies on the presentation of signed prescriptions issued by a licensed and registered medical practitioner, licensed and/or registered dentist (for dental treatment only), and/or licensed and/or registered veterinarian (for animal treatment only), and the supply and dispensing of these medicines must be carried out by a pharmacist or under the supervision of a pharmacist. Prescription-only medicines are further subdivided into controlled medicines (narcotic medicines and psychotropic substances) and non-controlled medicines" (WHO, 2014). The *Over-The-Counter medicine* is "a medicine that can be sold from licensed dealers (pharmacists) without professional supervision and without prescription. These medicines are suitable for self-medication for minor disease and symptoms" (WHO, 2014).

In terms of spending in Egypt, as reflected in table (2), prescription medicines constitute

82.5% of total spending on pharmaceuticals in Egypt, compared to 17.5% for OTC medicines (Kanavos et al., 2018, P. 10). It is important to note that almost all pharmaceuticals are sold at community pharmacies without the strict need of a prescription, except the controlled medicines (narcotic medicines and psychotropic substances).

Furthermore, pharmaceuticals, according to the method of their manufacturing, are either traditional pharmaceuticals manufactured via chemical synthesis process; or biological medicines (biologicals), which include a wide range of products such as vaccines, blood and blood components, where Biologics are isolated from a variety of natural sources — human, animal, or microorganism — and may be produced by biotechnology methods and other cutting-edge technologies (FDA, 2017b). Biological products have a distinctive set of regulations that is different from other normal pharmaceuticals.

Finally, it is important to note that the pharmaceutical market differs from markets for most other commodities. Generally, pharmaceutical markets are not competitive markets per se, rather they are highly regulated markets. These regulations come in response to the fact that pharmaceuticals are special commodities; used appropriately they can save lives and improve health; used inappropriately they can be very harmful (WHO, 1995, P. ii). Moreover, the pharmaceutical markets suffer from a number of identified and worldwide market imperfections / failures such as: asymmetric flow of information or informational imbalances between different actors in the sector; lack of free competition created by patent protection; and external benefits in medicines consumption.

Additional features are highlighted given the Egyptian context, such as the blurred boundaries between prescription and OTC drugs where both can be dispensed from community pharmacies without the need to have a physician prescription[8]. Also, in Egypt, most physicians prescribe using trade name of medicine, whether originator brand or generic; pharmacists are not expected to automatically substitute for the originator brand or other generic, and in some cases it is negatively perceived or refused by the patient. However, with consumer consent, the pharmacist can dispense any (interchangeable) pharmaceutical product.

[8] Except medications affecting the central nervous system and those leading to addiction 'controlled medicines' (as discussed earlier)

1.2.2. Pharmaceutical Policy and Regulations:

Egyptian Pharmaceutical Policy and The General Regulatory and Legal Framework:

Pharmaceutical policy is defined as "the principles guiding decision making in the field of pharmaceuticals. Its goal is to contribute to the overall health, welfare, and well-being of the society. It includes any policy that attempts to improve or regulate registration, reimbursement, and distribution of pharmaceuticals" (Almarsdóttir & Traulsen, 2006e, p.7). It is currently a hot topic in most Western countries and can be found on the agendas of international organizations, such as the World Bank, Organization for Economic Co-operation and Development (OECD), the European Union (EU), and the WHO. However, pharmaceutical policy, as an activity, has existed as long as "pharmaceuticals have been in existence and society has felt the need to regulate them" (Seiter, 2010).

Early in the 1930s, rare state regulations did exist to ensure the safety and efficacy of medicines, mostly in Sweden. However, it was not until the 1960s, and after the *Thalidomide* incident in America, where the role of the state in regulating the safety and efficacy of medicines became a very important issue in pharmaceutical policy (Almarsdóttir & Traulsen, 2005a). After then, different countries have started to take over the responsibility for assessing drug safety and efficacy before being marketed. Today, most countries have some form of national regulatory authority (NRAs); such as: the Food and Drug Administration (FDA) in United States of America (USA), European Medicines Agency (EMA) in Europe, Therapeutic Goods Administration (TGA) in Australia.

Pharmaceutical policy is getting more complicated in response to the complex nature of pharmaceutical markets, the need to offset market imperfections/failures, and to balance a number of conflicting policy goals in a way that maximizes public interest. Therefore, government intervention has been a requirement to pharmaceutical market to function effectively; according to the WHO (1995), the main essential state responsibilities include:

- Policy-making (developing, implementing and monitoring national drug policies);
- Drug regulation (licensing and inspecting premises and manufacturers, registration of drugs, control of marketing, and post-marketing surveillance);
- Professional standards (education and licensing standards for pharmacists, doctors and other health professionals, developing and enforcing codes of conduct);

- Access to drugs (subsidizing essential drugs for the poor and for communicable diseases, supplying drugs through government health services and ensuring universal access);
- Rational use of drugs (establishing standards, educating health professionals and supporting public and patient education).

While pharmaceutical policies, generally, address issues relating to access, quality, and cost of pharmaceuticals (Almarsdóttir & Traulsen, 2005d), the state intervening responsibilities are highlighted in Seiter (2010), who argued that the goals and core objectives of pharmaceutical policy might mean different things in different countries, and that "there is no 'one size fits all' approach." The Egyptian pharmaceutical policy, as a middle income country, should aim to achieve "access to a broader range of medicines, pooled financing mechanisms, and industrial development in the pharmaceutical sector." (Seiter, 2010, P. 2)

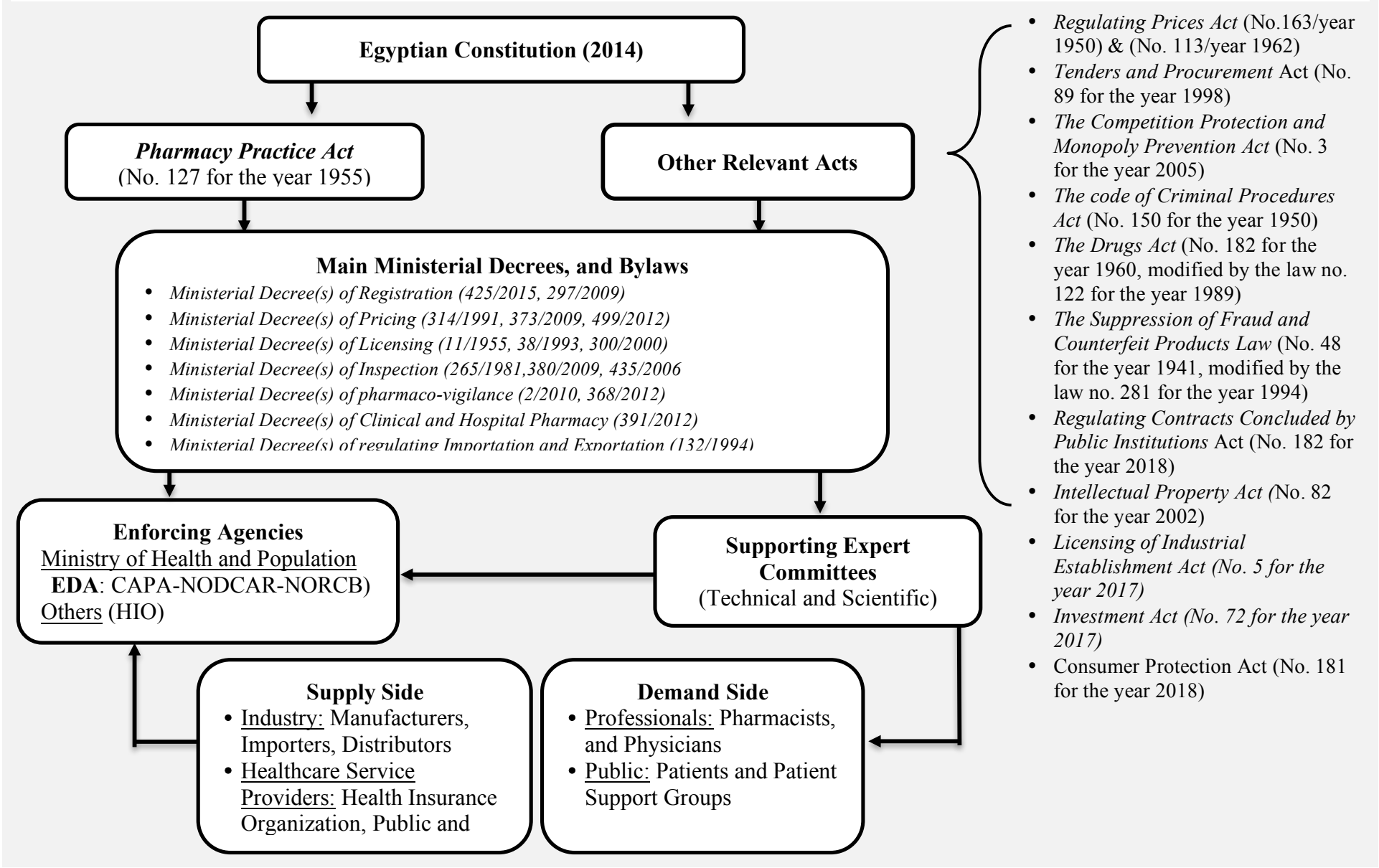
In Egypt, the Egyptian Drug Authority (EDA) is the institutional framework responsible for defining and putting in place pharmaceutical policies; and regulating pharmaceuticals to ensure their effectiveness, safety, quality, and, to great extent, affordability.

The EDA, though not formalized yet as a separate and comprehensive entity, includes three separate organizations, under the umbrella of the Egyptian MOHP. Those are the Central Administration for Pharmaceutical Affairs (CAPA), National Organization for Drug Control and Research (NODCAR), and National Organization for Research and Control of Biologicals (NORCB). Additionally, the EDA oversight the health directorates in each governorate.

CAPA is the main regulatory body responsible for a number of varied functions related to pharmaceutical products; such as: registration, licensing, inspection, pricing, importation and exportation approvals, post-marketing surveillance activities, etc. Both NODCAR and NORCB are research based central laboratories, responsible for laboratory analysis to ensure medicines safety and efficacy. The former is concerned with pharmaceuticals in general, the second is concerned with biological products such as vaccines, blood products, etc. (EDA, n.d.)

As explained by Seiter (2010), pharmaceutical policy should be achieved through "set of laws, rules, procedures, and incentives" (P. 3). Therefore, "one way of describing a policy framework is to map the legal and institutional hierarchy that governs market and stakeholder interactions" (Seiter, 2010, P. 3). The hierarchy of laws, regulations, and implementing agencies of the pharmaceutical policy in Egypt, is shown in figure (1).

Figure (1): The Hierarchy of Laws, Regulations, and Implementing Agencies of the Pharmaceutical Policy in Egypt



Source, Author's Conceptualization based on Seiter (2010), Egypt (1950: 2018), MOHP (1991: 2018) & EDA (n.d.)

Main Regulatory Functions:

As discussed earlier, the EDA is responsible for regulating pharmaceuticals to ensure their effectiveness, safety, quality, and, to great extent, affordability. According to the Pharmacy Practice Law 'Number 127 for the year 1955' (Egypt, 1955) and the subsequent Ministerial Decrees and Bylaws, the main functions performed and supervised by the MOHP/EDA, to ensure effective regulation of the manufacture, distribution and use of medicines/pharmaceuticals and other health technologies (HT), include:

o Registration and Market Access:

Pharmaceutical products have to be registered in CAPA/EDA before being marketed. A complete evaluation and review process for each pharmaceutical is performed where specialized technical and scientific committees review and assess the different studies and certificates of the pharmaceutical product, including different laboratory-based studies, clinical studies (in some cases), stability studies, as well as **bioequivalence**[9] studies (in the case of generic medicines to ensure their pharmaceutical and therapeutic equivalence to originator/brand-name medicines). After a complete process of evaluations and assessments, and if the product is proven to be efficacious, effective, safe for use, and of good quality; CAPA/EDA issues the Marketing Authorization' (MA), or 'Registration Certificate' for the product, which is usually valid for ten years[(10)]. Once the product is registered, it should be marketed; otherwise its registration will be cancelled. (MOHP, 2009a) & (MOHP, 2015); unless the product is a generic product and its originator/innovator is still under enforced patency. Box (1) explains the Pharmaceutical Patency Legal Framework in Egypt.

Pharmaceutical registration process, in Egypt, is considered one of the first market access barriers. First, because it is a lengthy process, "it could take up to five years" (BMI, 2015). Second,

[9] In order to market a generic version of a medicine, NRAs (such as FDA and CAPA/EDA as well) require that the generic drug must be **bioequivalent with the original brand drug**. Bioequivalence means "The absence of a significant difference in the rate and extent to which the active ingredient or active moiety in pharmaceutical equivalents or pharmaceutical alternatives becomes available at the site of drug action when administered at the same molar dose under similar conditions in an appropriately designed study" (US FDA, 2018)
Hence, the bioequivalence test assesses if the two pharmaceutical products are bioequivalent; i.e.: pharmaceutically equivalent and their bio-availabilities after administration are similar to such a degree that their effects, with respect to both efficacy and safety, can be expected to be essentially the same. Pharmaceutical equivalence implies the same amount of the same active substance(s), in the same dosage form, for the same route of administration and meeting the same or comparable standards. (MSH, 2012)

[10] After ten years, the product is submitted for '*re-Registration*' process; in order to check and re-evaluate its safety, effectiveness, and quality

because pharmaceutical registration in Egypt follows what is called a "boxes" system, where a definite number of similar products are only allowed to be registered; for any API in a specific dosage form only '12' pharmaceutical products are permitted; the first is the brand or innovator product, and '11' generic products ('10' locally manufactured generic products and '1' imported generic product). This 'boxes' system limits the number of products allowed to be registered and marketed from a certain medicine (drug).

Box (1): The Pharmaceutical Patency Legal Framework in Egypt

- Patents are, usually, granted for innovator pharmaceuticals to permit the innovator company to recover its research investments and costs, where the innovator/originator pharmaceutical enjoy an exclusive manufacturing and marketing rights over a given duration (patent duration), as regulated by the World Trade Organizations (WTOs) and the Trade Related Aspect of Intellectual Property Rights (TRIPS) agreement.
- Following the expiry of originator patency, usually for a maximum of 20 years, generic drugs are allowed in the market.
- In response to serious concerns regarding grant of patent protection to the new pharmaceuticals and its impact on health care, the Doha Declaration on the TRIPS agreement was adopted in the 4th WTO ministerial conference held in November 2001; which added that "the Agreement [TRIPS agreement] can and should be interpreted and implemented in a manner supportive of WTO Members' right to protect public health and, in particular, to promote access to medicines for all" (WTO, 2001).
- The Doha Declaration on the TRIPS agreement granted further flexibilities to the member countries, such as provision of '***compulsory licensing,***' which empowers the government to produce the patented product or process without the consent of the patent owner on almost any ground that involves public interest, or anticompetitive conduct, or for noncommercial government use. The power to exercise compulsory licensing is subject to few preconditions including to inform and negotiate a voluntary license from the patent holder and ensure adequate remuneration is being paid. However, these specific preconditions are waived in the case of 'national emergency.' (WTO, 2001)
- Another wave of bilateral international agreements has emerged called free trade agreements (FTAs). The common feature to almost all the FTAs signed or negotiated across the world is the inclusion of many ***TRIPS plus provisions*** which provided enhanced intellectual protection to the pharmaceuticals. Some important TRIPS plus provisions include:
  1. Patent term extension: "extends the patent terms to accommodate any unreasonable delay in examining or approval of patent application. No maximum duration has

been mentioned in most of the FTAs." (Correa, 2006)

2. Data exclusivity: "mandates the parties to provide 5 years of exclusive rights to the innovator company from the date of approval of product." (Ibid.)
3. Patent linkage: "obligates the state health authority to deny approval to generic version if the product is under patent protection unless consented to by the patent holder." (Ibid.)
4. Compulsory licenses: "limits the grounds of giving compulsory licenses to the cases of anticompetitive practices, noncommercial use, or national emergency." (Ibid.)
5. Parallel import: "limits the possibility of parallel imports from foreign markets." (Ibid.)

- The restrictions applied by FTAs are against the spirit of the Doha Declaration on TRIPS agreement as a measure to promote access of medicines at affordable costs for the poor people residing in developing and underdeveloped countries.
- The pharmaceutical intellectual property rights in Egypt are regulated according to the **Intellectual Property Act number 82 for the year 2002**; which enforces the implementation of the TRIPS Agreement and the subsequent DOHA regulations (Egypt, 2002); and not the TRIPS Plus Provisions.

- **Pricing***:*

Pharmaceutical products have to be priced before being marketed. State-regulated pricing of pharmaceuticals dates back to the 1950s (Egypt, 1950). With the aim of ensuring pharmaceutical's affordability to Egyptian patients, the pharmaceutical sector still operates under price controls; where the public prices and profit margins for manufacturer(s)/ importer(s), distributor(s) and pharmacist(s) are regulated. The old cost-plus and mark up regulation pricing policy (MOHP, 1991) was shifted to the external reference pricing (MOHP, 2009b); and, later, combined with mark-up regulations (MOHP, 2012).

According to the current pricing policy, *Innovator* (*originator branded*) products are priced according to their market price in a number of reference countries. Additionally, the pricing committee can refer to any country where the product is marketed. Brand (originator) pharmaceuticals are priced according to the lowest international market price. The list of pricing reference countries, according to MOHP (2012), is illustrated in Box (2).

Box (2): List of Pricing Reference Countries

1	Algeria	19	Jordan
2	Austria	20	Kingdom of Saudi Arabia
3	Argentina	21	Kuwait
4	Bahrain	22	Lebanon
5	Belgium	23	Morocco
6	Canada	24	Netherlands
7	Cyprus	25	Norway
8	Denmark	26	Oman
9	Finland	27	Philippines
10	France	28	Poland
11	Germany	29	Portugal
12	Greece	30	Spain
13	Hungary	31	Sudan
14	India	32	Sweden
15	Iran	33	Switzerland
16	Ireland	34	Turkey
17	Italy	35	United Arab Emirates
18	Japan	36	United Kingdom

Source: MOHP, 2012, annex (1)

Generic products, whether imported and locally manufactured, are subject to a mark down percentage from the branded product price; the first five generic products are priced at 65% of the brand price in Egypt, compared to 60% of the brand for the remaining generics in the 'box' (MOHP, 2012, Article 4). "High technology" generic products are priced at 70% and 65% of their branded comparator in reference and non-reference countries respectively (MOHP, 2012, Article 5).

The pharmaceuticals' profit margins (mark-ups), for distributor and pharmacists are illustrated in Box (3).

Box (3): Pharmaceuticals' Profit Margins (Mark-Ups)

Imported Pharmaceuticals	Locally Manufactured Pharmaceuticals
* Public Price < 500 EGP **Distributor** Margin: **8.8%** of Importation Price **Pharmacist** Margin: **22.9 %** of Distributor Price * Public Price > 500 EGP **Distributor** Margin: **6.4%** of Importation Price (Maximum 150 EGP) **Pharmacist** Margin: **18.5%** of Distributor Price (Maximum 450 EGP)	**Distributor** Margin: **8.8%** of Importation Price **Pharmacist** Margin: **30 %** of Distributor Price

Source: MOHP, 2012, Article 6

- **Licensing and Inspection:**

In order to ensure that pharmaceuticals are manufactured, transported, stored and handled in a way that ensure their effectiveness, safety and quality; all pharmaceutical facilities (factories, warehouses, pharmacies, etc) are required to be licensed from the MOHP prior to operation (Egypt, 1955).

Additionally, periodic inspections are usually carried out by CAPA/EDA[11] to ensure the compliance of the different pharmaceutical facilities to the issued regulations and guidelines; mainly Good Manufacturing Practices (GMPs), Good Distribution Practices (GDPs), Good Storage Practices (GSPs), etc.

- **Post-Marketing Surveillance (Pharmacovigilance):**

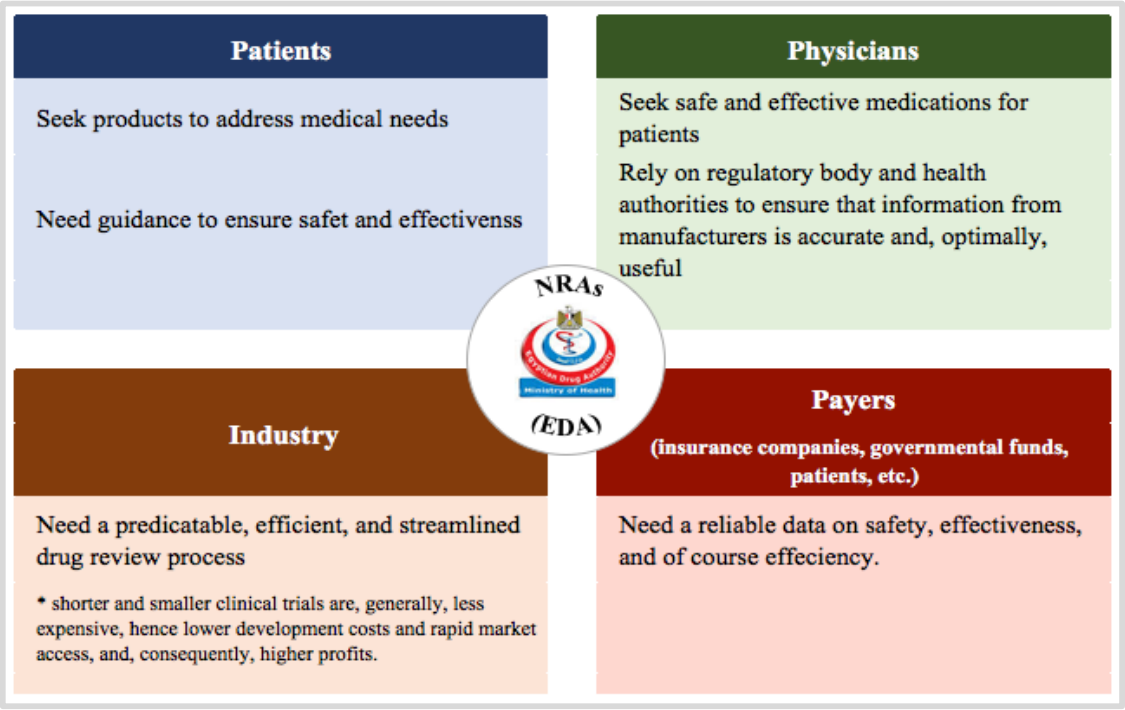
The Egyptian Pharmacovigilance Centre (EPVC) was created in early 2012 and was mandated to monitor drugs after their release for adverse drug reactions (ADRs). The implementation of a pharmacovigilance (PV) system and the reporting of ADRs have been made mandatory for pharmaceutical firms, as part of a wider increase of pharmaceutical regulations in Egypt (MOHP, 2015).

[11] Health Directorates at the different Egyptian governorates carry out inspections too; mainly on pharmacies and warehouses in their geographical region

In conclusion, it is vital to reflect that the Egyptian Drug Authority (EDA/ CAPA), as other NRAs, are usually balancing the tradeoffs inherent in drug regulation, where broader testing and evaluation can provide useful information about a drug, help reveal more details about potential safety concerns before a drug is widely used, and also, further details concerning drug use in certain at-risk populations like children, pregnant women, or the elderly. However, it is time-consuming and expensive; hence, the more that's required, the longer the time before physicians are able to prescribe the drug (whether innovator or generic) to their patients (delayed market availability of medications); and if the cost of testing exceeds the expected financial return, a for-profit manufacturer may decide not to develop (or market) a medicine at all, or fewer companies may develop related medicines, potentially reducing both competition and patient options.

Similarly, regulatory oversight of the pharmaceutical market protects the public, but requires significant resources, otherwise delayed reviews will, in return, delay market availability of the drugs. The EDA tries its best to balance requirements from a number of different stakeholder groups; patients, physicians, pharmaceutical industry, payers (insurance companies or governmental funds). Figure (2) summarizes the main stakeholders' requirement from the pharmaceutical regulatory process.

Figure (2): The Main Stakeholders' Requirement from the Pharmaceutical Regulatory Process



Source, Author's Conceptualization based on Literature Review and Interviewing the different Stakeholders

1.2.3. An Economic Downturn and its impact on the Pharmaceutical Market and Medicines availability:

Recently, Egypt has been facing economic challenging conditions, manifested mainly during the years of 2014 to 2016, where the Egyptian economy had been set back by a shortage of foreign currency inflows. Hence, the foreign currency reserves, as shown in figure (3), reflected threateningly below average levels; the net international reserves reached 16.6 billion USD (United States Dollar) at the end of August, 2016, compared to 36 billion USD at the end of 2010 (CBE, n.d.) & (AmChamb, 2017).

Figure (3): Egypt Foreign Exchange Reserves(*) (2010 - 2018), millions USD

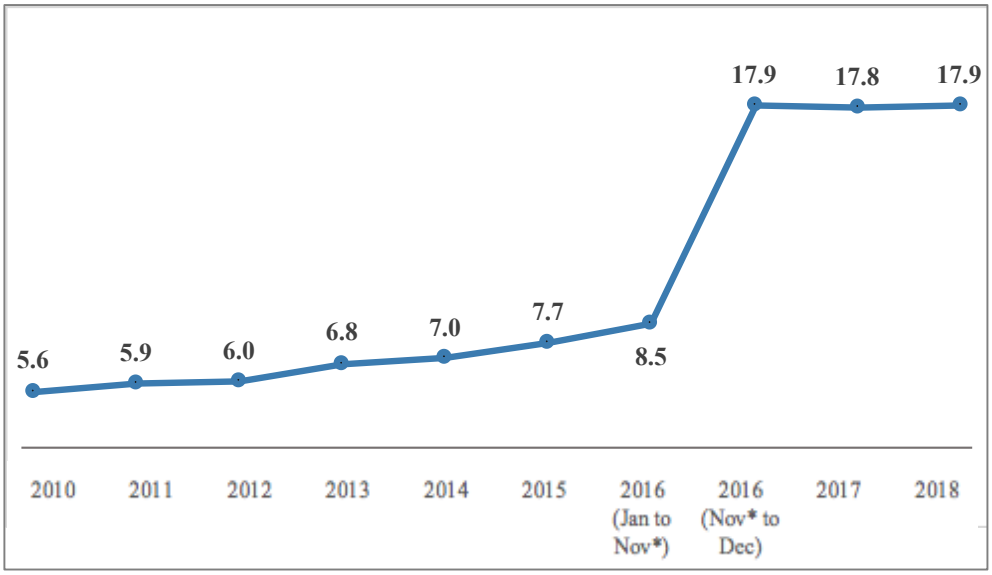
Notes: (*) Foreign Exchange Reserves are the foreign assets held or controlled by the country central bank. The reserves are made of gold or a specific currency. They can also be special drawing rights and marketable securities denominated in foreign currencies like treasury bills, government bonds, corporate bonds and equities and foreign currency loans.

***Source**:* CBE (2019) & Trading Economics (2019)

During this period, the government of Egypt tried several economic reforms which proved to have temporary effects. The CBE (Central Bank of Egypt) started by putting a cap on the amount of foreign currencies for businesses and individuals to ease the pressure on bank reserves (AmChamb, 2017). Later, restrictive measures were imposed on providing foreign currencies, where only strategic goods and services were considered by the CBE and commercial banks got the right to determine the amount of foreign currency to provide businesses, based on the necessity of the imported goods.

On November 2016, the CBE floated the Egyptian pound (EGP); in an attempt to "stabilize the economy, meet the requirements of the International Monetary Fund (IMF), boost the external competitiveness through a weaker currency, encourage foreign investors back to the country through a more transparent economy, and to end the currency black market which was trading at double the price set by the CBE at that time" (Insider & Holodony, 2016) and (PwC Middle East, 2017). As shown in figure (4), the floatation of the EGP on November 2016 was accompanied by severe devaluation (around 50 percent) in the value of the EGP.

Figure (4): The EGP to USD Exchange Rates (2010 – 2018)



Notes: (*) November 3rd, 2016
***Source**:* CBE (2019)

The persistent foreign exchange shortage, and the subsequent sharp currency devaluation, severely hampered and impacted every sector of the economy; especially those relying on imports (either imported finished products or production inputs) (AmChamb, 2017). The pharmaceutical sector was one of the highly impacted sectors, if not the highest.

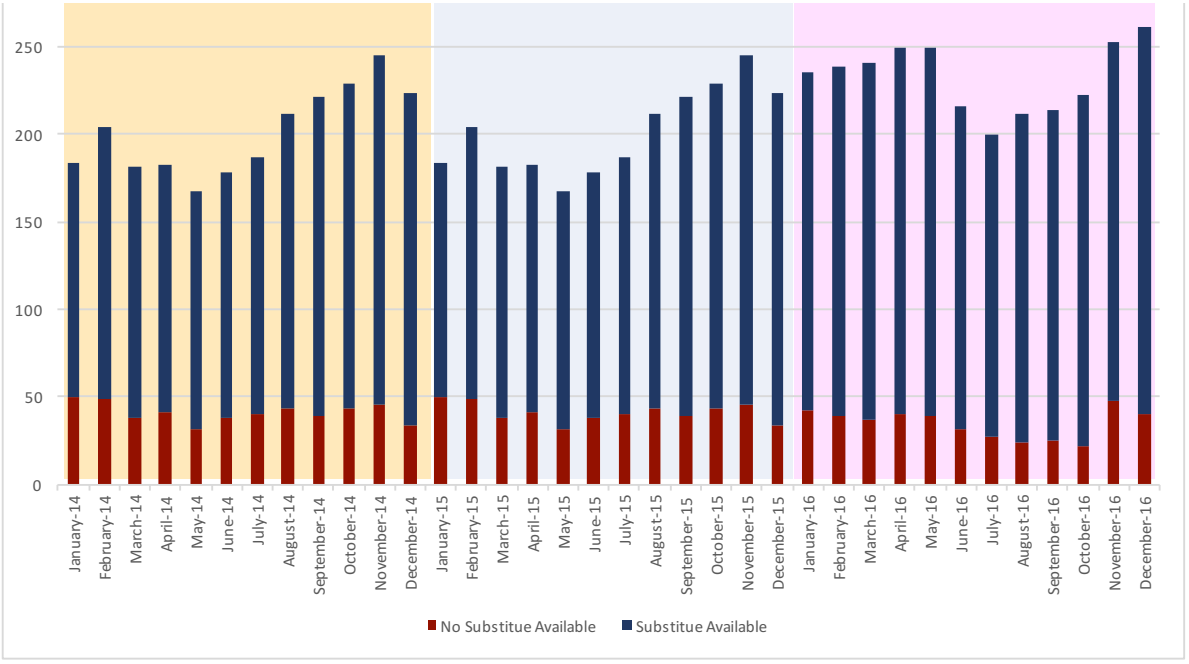
As introduced earlier, the pharmaceutical market is a highly regulated market, and, in terms of prices, pharmaceuticals have fixed prices (public prices) set up by the EDA/MOHP. Subsequently, there were aggravated challenges to ensure the availability of the different pharmaceutical products and medications; '*shortages'* of medicines and pharmaceutical supplies started to manifest as a national problem where scores of products became unprofitable to produce

or import. As reflected in different media platforms, pharmaceutical companies declared their "inability to raise prices above levels set the Health Ministry but now paying roughly twice as much to import drugs or active ingredients; pharmaceutical firms said they have been forced to phase out certain medicine to stay in business" (Gaballah & Knecht, 2016); and "pharmacists countrywide have reported acute shortages of an ever-widening range of locally-produced and imported pharmaceutical products" (Ahram Online, 2013).

According to the EDA, and as illustrated in figure (5), a high number of pharmaceuticals were reported in the monthly shortage list, highlighting the negative impacts of the tight economic situation and currency restrictions on the pharmaceutical sector. The average number of total pharmaceuticals in shortage averaged '201,' '201,' '232,' during the years 2014, 2015 and 2016 respectively. During the first few months of 2017, though not officially announced, different EDA and media sources reflect that the total number of pharmaceuticals in shortage averaged '312' (El-Ahram, 2017). Out of these medicines, there were, worryingly, around 40 medicine, on monthly average, in shortage with no similar or substitute available in the market.

Additionally, it was declared by the Minister of Health and Population, later in 2016, that "among more than 12 thousand registered pharmaceutical products, only around 8 thousand products regularly available in the market." (El-Ahram, 2016a)

Figure (5): Pharmaceutical Shortage Statistics, Egypt, 2014 - 2016



***Source**:* EDA (n.d.)

1.2.4. Main Interventions:

In response to the aggravated challenges faced by the pharmaceutical sector, and in order to accommodate the situation and enable pharmaceuticals to sustain its health and economic objectives; the Government of Egypt, represented by MOHP, started to adopt and implement a number of pharmaceutical policies and interventions to ensure the availability of the different pharmaceutical products and medications. The main interventions included: price adjustments (increases), accelerating the registration and market access of new pharmaceutical products, initiation of a Pharmaceutical Track and Trace Project, supporting the State-Owned Pharmaceutical companies, launching a comprehensive Health Insurance system, and recently, radical changes in the registration process (opening the 'boxes' of certain pharmaceuticals).

The first intervention was price adjustment (increases) in order to quickly maintain medicines availability and prevent further shortages. Two waves of price increases were announced; the first in May 2016, where the Prime-Minister Decree Number Thirty-Two was announced to "increase the prices of all pharmaceuticals under 30 EGP by 20 percent, with a 2 EGP as a minimum, and 6 EGP as a maximum per the pack¨ (El-Ahram, 2016a). According to the Minister of Health and Population, this decree resulted in increasing or adjusting the price of around seven thousand pharmaceutical products, those which were previously priced below thirty Egyptian Pound. He explained that this category [prices below 30 EGP] used to have a slight profit margin, and, as a result to the economic challenges, their production incurred losses to many manufacturers, who, finally, stopped producing them. Consequently, the patients, in most cases, have transitioned into more expensive products (El-Ahram, 2016a).

The second wave of price adjustments (increases) was in January 2017, where the Ministerial Decree Number '23' for the year '2017' was announced to increase the price of 20 percent of the imported medicines and 15 percent of the locally manufactured ones. The percentages of increase were 50 percent for pharmaceuticals priced below 50 EGP; 30 percent for pharmaceuticals priced from 50 to 100 EGP; and 25 percent for pharmaceuticals priced from 100 to 150 EGP (El-Ahram, 2017). Although the decree has resulted in increasing the prices of three thousand pharmaceutical products (MOHP, 2017), these products were selected in a way to to minimize the financial burden from the average patient; "the majority of the price-adjusted pharmaceuticals were selected from the medications of acute diseases, not chronic ones; as medications used for acute diseases, such as

antibiotics, common cold medications, are not expected to be used for a long time, compared to medications used to treat chronic conditions, such as hypertension and diabetes, which are expected to be a life-long treatment." (El-Ahram, 2017)

Another important intervention is accelerating the registration process for new pharmaceutical products, as declared in the Ministerial Decree Number '820' for the year '2016' (MOHP, 2016). With the purpose of improving the access of Egyptian patients to new medicinal products, and supporting pharmaceutical companies to launch their products in the market in a timely and profitable manner, the MOHP has approved an accelerated registration process in only one month for pharmaceuticals approved by both the FDA and the EMA; two months for pharmaceuticals approved by either the FDA or the EMA; and six months for any products submitted for registration with a CTD (Common Technical Dossier) file. Hence, the decree encouraged all pharmaceutical companies, including local manufacturers, to submit their products for assessment and registration with a complete technical file in advance to ensure the quality standards of the product and in return gain an accelerated access to the domestic market.

The implementation of a Pharmaceutical Track and Trace System[12] was announced in February 2016 (MOHP, 2016a), where the distribution, forward 'track' and backward 'trace', of every medicine in the country will be monitored and recorded on a central database, in EDA/MOHP, using a unique matrix code. The full implementation of the system will allow EDA to monitor pharmaceuticals distribution and usage in the country, securing the pharmaceutical supply chain against any parallel illegal importation or exportation of pharmaceuticals. The resulting database, together with the secured supply chain, will enable the country to formulate a more accurate regulatory policies regarding prices, public procurement, manufacture and importation needs, and prices setting as well.

State-owned pharmaceutical companies have been seen as a vital player in the pharmaceutical market, who can ensure adequate supply of generic pharmaceuticals at affordable price (Extra New, 2017), (Elyoum Elsabee, 2018). A comprehensive evaluation and reform plan for the different state-owned pharmaceutical companies was launched (Elmwaten, 2019).

[12] The Pharmaceutical Track and Trace System is a project under current implementation, where each pharmaceutical product should have a unique serial number (matrix), and following up this number would enable the health authority to follow up and monitor the distribution of pharmaceuticals from their manufacturing/importation to their use and backward.

On a broader scale, a Comprehensive/ Universal Health Insurance Law was issued early on January 2018 (Egypt, 2018). The law which will ensure health insurance coverage to broader sectors of the society, leading to better access to healthcare and medication without increasing the OOP burden on the average Egyptian patient.

Recently, the MOHP declared a new decree, Ministerial Decree Number 654 for the year 2018 (MOHP, 2018), according to this decree, pharmaceuticals were allowed to be registered in EDA/MOHP in numbers exceeding the allowed number per each box (12 products). The decree, which is known as 'Over the Box Decree,' aims at increasing the availability of quality-assured pharmaceutical products in the market and encouraging investments in the pharmaceutical sector. According to the decree companies can submit a product for registration, even its box is complete, if the product is listed in the shortage list during the previous year, if the production line is rare in Egypt (very few production lines are available such as Eye drops production lines for example), and if the pharmaceutical company has a new (recent or under-construction) production facility or will be exporting this product. Hence, the decree aims at creating a good flow of supplied pharmaceutical according to the actual market needs and avoid over-supplying the market with unneeded products.

1.3. Research Dilemma and Justification:

The combination of NCD prevalence, economic and fiscal pressures, as well as the national priority to achieve universal health insurance/ coverage provide a challenging environment for health care services and its components. Unavoidably, pharmaceuticals are a vital component; with its very important and conflicting objectives of increasing access to treatment 'social objective,' promoting the industry 'economic objective,' with a parallel pharmaceutical cost containment 'financial burden objective.' (Almarsdóttir & Traulsen, 2005c)

In the aftermaths of economically challenging conditions, pharmaceutical (drug) shortage, together with its serious ramifications, soars as a persistent challenge to realizing the aspired public health goals. Patients may continue suffering from their illness without improvement, they may receive wrong medication, or resort to unnecessary surgical operation, or a required surgical operation may be delayed or cancelled, leading to patient death, as explained by Abdelrahman, Saad, Sabry & Farid (2016) in the Egyptian context.

Once a particular medication is not available, and with the persistent need of that specific

product, patients and medicine users start resorting to any possible way in order to get the needed medication which sometimes end up buying smuggled medicines, with no insurance or regulation concerning its storage and transportation conditions and, hence, its effectiveness and safety. Additionally, marketing falsified and counterfeited medicines gets flourished and increased in a parallel way with medication shortages.

In order to ensure the availability of pharmaceutical products, especially after economically challenging conditions, governments and health authorities need to implement a combination of different pharmaceutical policies targeting both the *supply* and *demand* sides of the market. Since 2015, the Egyptian government has focused on a number of policy interventions targeting, only, the *supply side* of the market, as discussed earlier.

According to Almarsdottir & Traulsen "Pharmaceutical policy has developed into a discipline whereby policymakers watch and learn from the interventions made in other countries and regions" (2005a, P.7). Therefore, learning from other countries, and building on their experiences, the documented best practices highlight the importance of targeting the demand side of the market, by promoting the use of generic medicines as therapeutically equivalent and cost-effective alternatives (Cameron et al. (2009 & 2012); Godman et al. (2010a & 2010b); Vogler et al. (2011); King & Kanavos (2012); Hassali et al. (2014); Leopold et al. (2014); Vogler et al. (2016)).

Although there are worldwide policies and interventions promoting the use of generic medicines in order to maximize their impact as therapeutically equivalent and cost-effective alternatives, and, hence, enhancing the accessibility to safe, effective, and affordable medications (Cameron et al. (2009 & 2012); Hassali et al. (2014); Vogler et al. (2016)); yet, the pharmaceutical market in Egypt reflect a situation were the use of generic medicines could be enhanced, which would mitigate the drug shortage problem and a number of its ramifications in Egypt. Spending on generic medicines only constitute 32 percent of total spending on health in Egypt, compared to other countries in the MENA region where spending on generics reaches around 50 percent (Table 2). Moreover, in a recent survey, Abdelrahman et al. (2016) concluded that patients are suffering from the adverse outcomes of drug shortages, including deaths. They emphasized the need for enhanced drug shortage communication and inter-professional education to improve drug shortage management, where physicians' awareness and acceptability of analogues [similar] products, which would be the generic counterparts, varied among participants and around 25 percent disagreed that

'analogues' would give the same effect as prescribed drugs.

Given the special features of the pharmaceutical market and its imperfections, multiple players should be involved in promoting the use of generic medicines, mainly: the regulators (health authority), the pharma-industry, professionals and healthcare providers, and the public (patients). From a regulatory and industry perspective, and based on the evidence from chemical and bioequivalence data, the therapeutic and safety equivalence between approved pharmaceutical products (originator and generics) is assumed, and should be, continuously, monitored and assured.

Generic policies related to pharmaceutical pricing, production capacities and sustainability are important supply side measures relating to market entry, however, demand-side measures are associated, mostly, with interventions at prescribing and dispensing levels and, to a varying degree, purchasing by consumers (patients).

Given that it was successfully established that patients are the main users of medicines, hence "[their] experiences and perspectives, [are] crucial source of knowledge for decision makers and policymakers," as described by Almarsdóttir & Traulsen (2005d, P. 276), it is highly significant to understand the knowledge, perceptions, and attitudes of patients towards the use of generic medicines; their comparable effectiveness, quality, safety, and cost.

Such significance is even intensified given the Egyptian context of low public expenditure on health, high private OOP spending, relaxed dispensing boundaries of OTC/ prescription medicines, trade (brand) name-based physicians' prescriptions—where the pharmacist usually need the patients' approval to dispense the equivalent generic, and the high prevalence of the private sector physicians—upon whom it may be quite challenging to enforce certain generic prescription policies. Jointly, all these factors place a high decision making power in the hands of the patients.

Furthermore, there is a scarce literature on the knowledge, perceptions, and attitudes of Egyptian patients towards generic medicines; to our knowledge, no prior studies have addressed this issue, which point out to the importance of assessing the current level of Egyptian patients' knowledge about the concept of generic medicines, their perceived levels of effectiveness, quality, safety, and cost. Above all it is important to understand their attitudes towards these medications in order to help pharmaceutical and health policymakers develop the required interventions that can effectively promote their use in the Egyptian context. This study provides scientific (theoretical) and societal relevance as well.

1.4. Goal, Aim and Objectives:

The goal of this study is to guide policy and decision makers on possible interventions that can promote the use of generic medicines as a therapeutically equivalent and cost effective alternatives. The evidence generated from the study will contribute towards improving policies, programs and practices, that can facilitate access to medication in a cost –effective way.

This study aims at analyzing the data collected in order to explore and assess the understanding of the Egyptians about the concept of generic medicines; their perceptions of its effectiveness, safety, quality, and cost; and extent to which they would be willing to use generic instead of originator branded medicines. The extent to which the different socio-economic determinants would impact these outcomes is also assessed.

The study should fulfill the following objectives:

1. Estimate the current knowledge levels of the Egyptian patients about the concept of generic medicines
2. Assess the perceptions of the Egyptian patients towards generic medicines, in terms of effectiveness, safety, quality, and cost
3. Evaluate their attitudes towards the use of generic medicines, and their willingness to use generic medicines instead of branded medicines.
4. Explore and gauge the impact of the different socio-economic determinants on the level of knowledge, perceptions, and attitudes of Egyptians towards generic medicines
5. Proposed any possible initiatives/interventions that can help the Egyptian patients to accept and trust the generic medicines as therapeutically equivalent and cost-effective alternatives?

1.5. Research Questions:

The main question this research study seeks to address is: "Under which conditions would the use of generic medicines be positively perceived and accepted by the Egyptians, as a therapeutically equivalent and cost-effective substitution of the branded innovator medicines?" whereas the specific research questions would be as follows:

- Sub-question (1): What are the current knowledge levels of the Egyptians about the concept of generic medicines?

- Sub-question (2): How do Egyptians perceive the safety, quality, effectiveness, and cost of generic compared to branded medicines?
- Sub-question (3): To what extent would the Egyptians be willing to use generic instead of branded medicines, if advised from the different healthcare professionals; physician, pharmacist, nurse, etc.?
- Sub-question (4): Which initiatives/interventions might help the Egyptians to accept and trust the generic medicines as therapeutically equivalent and cost-effective alternatives?

The present study is divided into seven chapters. **Chapter one** contains the introduction that gives a glance about the Egyptian context of the pharmaceutical sector, and its regulations, the economic downturn and its impact on pharmaceuticals and medicines availability, and the main interventions employed by the government. This is followed by explaining the research dilemma and its significance, as well as the specific research questions. **Chapter two** presents the literature review which highlights the impact of economically challenging conditions on the health and healthcare services, including pharmaceuticals, and explore the different pharmaceutical policies implemented and recommended during, and after, economic downturns; a focused review about *promoting the use of generic medicine*, as a widely recommended and implemented policy intervention, has been conducted. The final part of the literature review was concluded with an extensive review of the studies assessing and investigating patients' and consumers' knowledge, perceptions, acceptance, and views of generic medicines, in different countries, and over time. **Chapter three** explains the used conceptual framework for the current study. **Chapter four** explain the research design; methodology, methods, instruments, study population and sample, measures, data analysis, limitations and delimitations of the study. **Chapter five** presents the results and findings of the research (quantitative analysis). **Chapter six** provides the discussion of both the quantitative and qualitative findings, in the light of the theoretical context and the reviewed literature. Finally, **chapter seven** links the different threads and provides the conclusion of the current investigation, with some possible recommendations based on the findings, in order to promote the trustful use of generic medicines, resulting in a cost-effective, improved access, and, hence, affordability, to medications, as well as contributing towards achieving a comprehensive and sustainable healthcare system.

Further descriptions and some supplementary data are available in the **appendices**.

Chapter Two: Literature Review

A preliminary broad scan of the literature has highlighted the impact of economically challenging conditions on the health and healthcare services, including pharmaceuticals. The different pharmaceutical policies implemented and recommended during, and after, economic downturns were explored. A focused review about *promoting the use of generic medicine*, as a widely recommended and implemented policy intervention, has been conducted. The review has considered a number of dimensions, mainly: quality, cost, impact and use of generic medicines; policies and strategies implemented in different countries to promote the use of generic medicines; the barriers facing the implementation of pro-generic medicines' policies; and, finally, recommendations to improve generic medicines' use.

With the emergence of a new view of healthcare, in which patients were expected and encouraged to take a more active role in their healthcare and treatment decisions, patients' experiences and perspectives became, more than ever, a crucial source of knowledge for decision and policy makers. Hence, the literature review was concluded with an extensive review of the studies assessing and investigating patients' and consumers' knowledge, perceptions, acceptance, and views of generic medicines, in different countries, and over time.

The literature review was conducted in English language based on published papers and journal articles from the disciplines of health and pharmaceutical policy as well as social policy, the reviewed articles and studies covers a wide time-frame starting from (1987) till more recently published ones (2019), the literature covered the experience of different countries.

Appendix (II) illustrates the literature review structure, and the main resources reviewed.

2.1. The Impact of Economic Downturns on Health, Health care and Pharmaceuticals:

Economic crises or recessions have both direct and indirect effects on the health status of the population(s), these effects were explored in different countries and diverse contexts. Musgrow (1987) explained that economic crisis results in (a) reduced income, either because of wage cuts or un-employments, leading to health insurance revenue decreases; (b) price increases, in both medicines and hospital and clinic fees, leading to fall in health service utilization; and (c) government expenditure decreases, with consequential cuts in the public health budget and reduction

in the public sector supply. All these factors combined lead to lowered access to health care, with serious equity concerns, and deterioration of the health status of the population, as elaborated, later, by Wibulpolprasert, Tangcharoensathien & Lertiendumrong (1998) and Yang, Prescott & Bae (2001).

In a convergent way, Waters, Saadah & Pradhan (2003), Zavras, Tsiantou, Pavi, Mylona, & Kyriopoulos (2012), Simou & Koutsogeorgou (2014), and Leopold et al. (2014) concluded that economic recessions have a detrimental effect on the health of the population because economic downturns are strongly associated with budgetary constraints to spend on health, increased number of uninsured citizens, and, consequently, increased out-of-pocket spending; resulting in a substantial reduction in health service utilization and negatively impacting the health status, unless the state offered "a corresponding expansion in health insurance coverage;" as the case of Thailand in 1997–98 Asian economic downturn (Waters et al., 2003, P. 172). Moreover, Zavras et al. (2012) highlighted that even "the probability of reporting poor self-rated health is higher at times of economic crisis" (P. 206).

While there is a large body of literature investigating the impact of economic downturn on health and health care, fewer studies investigated the impact of an economic recession on the consumption of medicines; mainly Yang et al. (2001), Suryawati, Ross-Degnan, Slamet, Nurita & Hogerzeil (2004) and Buysse, Laing & Mantel (2010).

By analyzing the urban household income-expenditure survey data, national health insurance claims data and public health center surveys in Korea, Yang et al. (2001) found out that "the rate of expenditure decrease is relatively higher for drugs [medicines /pharmaceuticals] expenditure than for expenditure on medical services" (P. 372).

Suryawati et al. (2004) examined the impact of the 1997 Asian Crisis on the availability, price and use of medicines in Indonesia in the period from 1997 to 2002. Although the study looked at only 12 different medicines, there was little change in the availability of these 12 medicines. A complementary IMS Health Study that investigated the impact of the 1997 Asian Crisis on the consumption of medicines concluded that during "the Asian Crisis a severe decline in GDP led to a more severe decline in pharmaceutical consumption" (IMS Health as cited in Buysse et al., 2010, P. 49). Additionally, the study found that the consumption of the medicines for an acute indication declined more and took longer to recover.

Buysse et al. (2010) investigated the impact of the global economic crisis on the consumption, expenditure and prices of medicines for different regions in the world (84 countries worldwide). The study found "a moderate correlation between GDP decline and pharmaceutical consumption decline, mainly for the 29 European countries" (P. 51). Contrary to the Asian crisis, as examined by Suryawati et al. (2004), Buysse at al. (2010) found "no distinction between the decline in medicines for acute and chronic indications" (P. 51). Moreover, the expected shift from private to public sector was only seen in Mexico, where health reform was implemented during this time period, making it difficult to link it to the economic downturn. (Buysse at al., 2010). In a more recent study, Phuong, Penm, Chaar, Oldfield & Moles (2019) investigated how as a result of economic instabilities, and other factors, medication shortages have become a growing worldwide issue. They concluded that "drug shortages were predominantly reported to have adverse economic, clinical and humanistic outcomes to patients" (P. 13).

Although the above discussed studies provide important insights on the impact of economic downturns on pharmaceutical consumption, critically, it is important to keep in mind that pharmaceutical sales may also be influenced by other market variables, such as patent expiration, presence or absence of local industry and generic competitions.

Another limitation or constraint is that pharmaceutical consumption in both cases was assessed at the aggregate country level, which, therefore, disregard the serious equity concerns and give a rosier picture compared to the analysis subdivided by income categories, particularly that in both cases a general price increase was seen during or after the recession. During economic downturn people with the lowest income experience the greatest decline in real household incomes, consequently, "the use of medical services by upper income groups is only slightly affected by the economic crisis, [whereas] lower income groups are spending relatively less on medical services" (Yang et al., 2001, P. 372).

2.2. Implemented Pharmaceutical Policies During and After Economic Downturns:

Generally, pharmaceutical policy recognizes conflicting interests endorsed by the strategic goals of the state. Such conflict and challenging situation becomes, even, aggravated during economic downturns and recessions. Different studies have reported how the realization of the planned pharmaceutical and health policy goals were gravelly challenged during periods of

economic instability; and, consequently, "a surge of policy changes seems to take place during economic recessions" (Leopold et al., 2014, P. 634).

Prior studies, Suryawati et al. (2004) and Buysse et al. (2010), reported and acknowledged the early success of the efforts, implemented by the Indonesian Ministry of Health, to maintain the availability and affordability of pharmaceuticals during the 1997-1998 Asian economic crisis. Four key measures were introduced; (1) the establishment of a monitoring system to ensure the availability of key essential medicines in public health facilities and the general availability of generic medications, (2) the provision of a national buffer stock of essential medicines, (3) the additional subsidy to cover the excess of exchange rate to buy raw materials for pharmaceutical companies producing generic medicines, and (4) the efficient use of international donations. However, as discussed earlier, the study looked, only, at 12 different medicines in Indonesia, and "while the medicines prices hardly increased during the [Asian crisis], they did so after the crisis by 25-50%" (Buysse et al., 2010, P. 49).

Following the global economic crisis of 2008-2009, a large body of literature reviewed the different pharmaceutical policies implemented, by different countries, in response to the economic downturn. Buysse et al. (2010) analyzed the main pharmaceutical policies implemented in different countries worldwide. Additionally, Leopold et al. (2014) reviewed the different pharmaceutical policies implemented, between 2008 and 2011, in eight European countries; Austria, Estonia, Finland, Greece, Ireland, Portugal, Slovakia, and Spain. Earlier, Vogler, Zimmermann, Leopold, de Joncheere (2011) considered a large country basket and reported 89 pharmaceutical policy measures in 33 European countries from January 2010 till February 2011.

Further evidence was provided by Behmane & Innus (2011) and Rüütel & Pudersell (2011) reflecting the pharmaceutical policy and the effects of the economic crisis in Latvia and Estonia. Moreover, numerous studies investigated the pharmaceutical and health policies implemented in Greece and Cyprus; Vandoros & Stargardt (2013), Petrou & Vandoros (2015) and Wouters & Kanavos (2015).

This extensive literature suggested that the main implemented pharmaceutical policies after economic downturns pertain to three main domains; (a) pricing related policies: price cuts, distribution remuneration and mark-up regulation, taxes on medicines and extra-ordinary price reviews, (b) cost containment and reimbursement policies: budget cuts, out-of-pocket payment,

delisting, and (c) generic medicines policies: generic substitution, public awareness campaigns and other generic policies (Leopold et al., 2014) & (Vandoros & Stargardt, 2013).

Vogler et al. (2011) found out that the most frequent measures are those which can be implemented rather swiftly, such as: price cuts, changes in co-payments and VAT rates on medicines. They concluded that "while the 'crisis countries' (e.g. Baltic states, Greece, Spain) reacted with a bundle of measures, reforms in other countries (e.g. Poland, Germany) were not directly linked to the crisis, but also aimed at containing public spending" (P. 22). In a convergent manner, Leopold et al. (2014) concluded that "the less economically stable countries implemented more pharmaceutical policy changes during the recession than economically stable countries; [where] economically stable countries implemented 7 or fewer policy changes each between 2008 and 2011; [compared to the] less economically stable countries which implemented between 10 and 22 changes each" (P. 633).

In an updated overview about the specific pharmaceutical policy changes implemented in 32 European countries between January 2010 and December 2015, Vogler, Zimmermann & de Joncheere (2016) reported a total of 557 measure (policy change), with an average of 17 measures per country. Different policies related to pharmaceutical pricing, reimbursement, distribution and rational use of medicines were reported.

Vogler et al. (2016) concluded that "two major areas that policy-makers tended to have a particular focus on; the first one concerns medicine prices, where the measures impacting medicine prices (price cuts, freezes, discounts arrangements and changes in the methodology of pricing policies) accounted for a total of 126 measures (23%). The second area that policy-makers apparently considered as a lever of change was generics. A total of 101 measures (18%) were identified in this field, including generic price changes, changes regarding the reference price system and demand-side measures to promote generics uptake" (P. 1373, 1374).

However, these studies cannot be considered as conclusive and the discussed implemented policies should be considered by other countries in the light of two facts. The first, is that the majority of the population, in the study countries, especially the western European countries, was covered by a social security system or national health service. The second is that it was not always clear whether a country implemented a policy as a short-term reaction to recession-related budgetary constraints or whether the policy was part of a planned long-term change to the system.

2.3. Promoting the Use of Generic Medicines as a Recommended Policy:

The literature pertaining to pharmaceutical policies and their impacts, strongly emphasized that promoting the use of generic medicines is an effective policy intervention that has a key role to play in the efficient allocation of the financial resources for pharmaceuticals, especially during and after economic downturns as discussed by Vogler et al. (2011), King & Kanavos (2012), Leopold et al. (2014) and Vogler et al. (2016).

As argued by Vogler et al. (2016), promoting generic medicines is considered as a leverage of change during economic recessions. During the years from 2010 to 2015, a number of generic promotion measures (33 measure) were enforced in the European countries; generic prescribing became mandatory in France, Greece, Italy, Latvia, Lithuania and Slovakia, and information campaigns were launched to raise awareness about generics in Estonia and Spain. (P. 1374).

Furthermore, with the rising costs of healthcare and the uncertain global economic situation, the use of generic medicines has been promoted as the main option to seek efficiency without compromising the quality of healthcare and public health. Over time, an extensive literature, Shrank et al., (2011), Cameron, Mantel-Teeuwisse, Leufkens, & Laing (2012), Babar, Kan, & Scahill (2014), Hassali et al. (2014), Rana & Roy (2015) and others provided evidence that the use of generic medicines is cost effective, where substantial savings could be achieved by switching from originator brand medicines to the therapeutically equivalent lower-priced generic medicines. Hence, the use of quality assured generic medicines was promoted in order to increase access and affordability of medications. as argued by WHO (2015) and others. Rana & Roy (2015) argued that "generic medicines are a cornerstone for providing affordable medicines to patients" (P. 529).

Governments and payers in many countries required the increased usage of generic medicines. As discussed by King & Kanavos (2002), Heikkilä et al. (2007), Simoens (2009), Iizuka (2009), Kaplan et al. (2012) and Hassali et al. (2014), many countries have implemented different policies to promote, encourage, or, even, enforce the use of generic medicines, such as United States (US), the United Kingdom (UK), Sweden, Finland, Australia, Japan, Malaysia and Thailand.

A number of the main themes of generic medicines will be discussed in more details in the following sections, including what is a generic medicine and their quality, cost, impact and use

world wide; the policies and strategies implemented to promote generics' use in different countries; the main barriers encountered to the implementation of pro-generic medicines' policies; and finally, the literature driven recommendations to improve generic medicines' use.

2.3.1. Generic Medicines: Quality, Cost, Impact, and Use

As introduced earlier, generic medicine is a pharmaceutical product which is bioequivalent to the innovator product in terms of dosage form, strength, route of administration, quality, safety, performance characteristics, and intended use. Generic medicines/ drugs have been defined by different international agencies, as follows:

> *"a generic medicine is a pharmaceutical product, usually intended to be interchangeable with an innovator product that is manufactured without a license from the innovator company and marketed after the expiry date of the patent or other exclusive rights"* (WHO, 2004)
>
> *"a generic medicine is a drug product that is bioequivalent to a brand or reference listed drug product in terms of dosage form, strength, route of administration, quality, safety, performance characteristics, and intended use"* (US FDA, n. d.)
>
> *"a generic medicine as a medicine that is developed to be the same as a medicine that has already been authorized. A generic medicine contains the same active substance(s) as the reference medicine, and it is used at the same dose(s) to treat the same disease (s) as the reference medicine. However, the name of the medicine, its appearance, and its packaging can be different from those of the reference medicine"* (EMA, 2012)

Both innovator (originator) and generic medicines have the same active ingredients (APIs), strength, pharmaceutical form, and route of administration; but the excipients (i.e. inactive ingredients) might differ from one product to another. Additionally, some other aspects including shape, color, taste (flavor), and packaging may be different as well (US FDA, n. d.).

Generic medicines are usually granted a market access after the expiry of the innovator patency (if applicable); and after proving that their safety, efficacy, and quality is comparable to the innovator (original) drug. The therapeutic and safety equivalence between the two products; originator and generics, is ensured via the bioequivalence and chemical data. The concept of bioequivalence is an essential regulatory requirement for the approval of generic medicines, where different medicines regulatory authorities (NRAs) require that the generic drug must be bioequivalent with the original brand drug.

As defined by the US FDA (2018), *bioequivalence* means "the absence of a significant difference in the rate and extent to which the active ingredient or active moiety in pharmaceutical equivalents or pharmaceutical alternatives becomes available at the site of drug action when administered at the same molar dose under similar conditions in an appropriately designed study" (US FDA, 2018). Hence, the bioequivalence test assesses if the two pharmaceutical products are bioequivalent; i.e.: pharmaceutically equivalent and their bio-availabilities after administration are similar to such a degree that their effects, with respect to both efficacy and safety, can be expected to be essentially the same. Pharmaceutical equivalence implies the same amount of the same active substance(s), in the same dosage form, for the same route of administration and meeting the same or comparable standards (Chow, 2014).

In addition to the therapeutic and safety equivalence of generic medicines, they offer a great opportunity for substantial financial savings, which help containing the escalating costs of healthcare in general, and medications, in particular. "The availability of generic versions of the drug in the markets substantially lowers the prices of the pharmaceutical products and decreases the healthcare cost for the community" (Rana & Roy, 2015, P. 529). These cost savings are mainly attributed to the fact that generic medicines are 20–90% cheaper than their counterpart innovator brands (Shafie & Hassali, 2008; Hassali et al., 2014). In LMICs, as analyzed by Cameron et al. (2009), the prices of the lowest cost generic medicines were on average 2.6 times less expensive than the corresponding originator medicines. In general, generics are priced lower than originators because their manufacturers do not incur the high Research and Development (R&D) costs associated with innovators. Moreover, medicines regulatory authorities (NRAs) do not ask generic manufacturers to repeat the costly clinical trials of the originator in order to grant market authorization, which depends on bioequivalence tests instead as discussed earlier.

Numerous studies have investigated and estimated the realized financial savings from using generic medicines. "Prescribing cheaper generic medicines by General Practitioners (GPs) in UK resulted in cost saving of around US $ 600 million in 2008" (Coombes, 2009). In the US, generic medicines saved the healthcare system 1.67 trillion dollars over 10 years from 2006 to 2016 (Generic Pharmaceutical Association, 2017, P. 20). During 2017, generics generated a total of $265 billion in savings in the US (Generic Pharmaceutical Association, 2018, P. 11).

Cameron et al. (2012) estimated the savings that could be obtained from a hypothetical

switch in medicine consumption from originator brands to the lowest-priced generic equivalents for a selection of medicines in 17 countries. The estimates showed that "an average of 9% to 89% could be saved by an individual country from a switch in private sector purchases from originator brands to lowest-priced generics." (Cameron et al., 2012, P. 664). In China, making this switch for only four medicines in the public sector could potentially save US $ 370 million, with an average of 65%" (Cameron et al., 2012, P. 664).

The impact of generic medicines, in containing the high and escalating costs of medicines, is not only attributed to the fact that generic medicines are cheaper substitutes for their branded innovator (originator) medicines; but, more importantly, they play a role in lowering the prices of the off-patent innovator medicines and other generic equivalents. According to the US FDA (2017), the price of a first entry generic medicine was only marginally lower than the innovator brand price; however, the entry of a second generic medicine dropped the average generic price to nearly half of the innovator brand price. As additional generic manufacturers market the product, the prices continue to fall. When a large number of generic medicines entered the market, the average generic price fell to 20% of the initial branded price or even lower.

Such key features of generic medicines; comparable quality and lower cost, have significantly resulted in, a cost-effective, improved access, and, hence, affordability, to medications, both for governments and individuals who have to pay out of pocket for medicines (Cameron, Ewen, Ross-Degnan, Ball & Laing, 2009) or (Cameron et al., 2009).

While most studies have, solely, focused on the financial savings of generic drugs, King & Kanavos (2002) argued that the savings that result from generic medicines' used can be, further, used to finance and purchase newer innovative medicines where they exist. This complementary and supportive view emphasizes the importance of having policies encouraging the use of generic medicines, alongside with policies that encourage innovation. Both are complementary and enforcing each other, in providing a good and sustainable healthcare and promoting the public health.

Therefore, more than ever before, **promoting the use of quality assured generic medicines has been recommended**, by the health related international organizations (WHO, 2001) & (WHO, 2015) and key scholars (Cameron et al., 2009 & 2012; Godman et al., 2010a & 2010b; Hassali et al., 2014, who argued in favor of its inclusion as part of the National Medicines Policy; as it helps to

"achieve a comprehensive and sustainable healthcare system" (Godman et al., 2010a, P. 2482).

Consequently, the use of generic medicines has been increasing all over the world. Generic medicines have become "the 'gold standard' and 'first-line therapy' for many acute and chronic diseases" (Sheppard, 2011). Generic medicines' market share (in volume) of the off-patented market ranges from 24% in Japan; 40% in Italy, Spain, Hungary; 55% in Turkey, France, Czech Republic; 65% in Brazil; 70% in UK, Poland, Germany; and 85% in Canada and USA (Sheppard, 2011, P. 3). Convergently, Rana & Roy (2015) argued that "prescription audits have shown that the percentage of medications prescribed by generic names varies from below 50% in India, Canada, Japan, and African countries to over 80% in countries such as USA, UK, China, and Australia" (P. 531-532).

Globally, the generic market was about $315 billion of a total pharmaceutical market worth $934 billion in 2017, exhibiting a compound annual growth rate (CAGR) of 6.7% during 2010-2017. The market is further projected to reach a value of US$ 474 Billion by 2023, at a CAGR of 6.8% during 2018-2023 (imarc, 2018).

2.3.2. Policies and Strategies Implemented to Promote Generics' Use in Different Countries:

Over time, an extensive literature has developed on the different countries' experiences and strategies to promote the use of generic medicines. However, due to significant differences among countries, implemented policies should be reviewed with consideration of the market structure that facilitates strong competition; health care system that enables enforcing issued policies and regulations; regulatory environment that assure generics' quality and, hence, impact the perception of their safety and effectiveness.

King & Kanavos (2002), Kaplan, Ritz, Vitello, & Wirtz (2012), Babar, Kan and Scahill (2014), Hassali et al. (2014), Moe-Byrne, Chambers, Harden & McDaid (2014) explored and reviewed the experiences of different countries in promoting generics' use. In general, there is a wide range of policies that have been or can be employed to promote generics' use and enable their aspired health and financial impacts; which can be, broadly, categorized as supply-side measures and demand-side measures. Supply-side measures relate to market entry and penetration of generic medicines, as well as issues around pharmaceutical pricing, reimbursements, determining pharmaceuticals available in a reimbursement (positive) list, and Intellectual Property Rights (IPR) issues. Demand-side measures are associated mostly with interventions at prescribing and

dispensing levels and purchasing by consumers (patients).

On the top of the policies impacting the supply for generic medicines is 'regulatory approvals,' which has a direct impact on competition within the pharmaceutical market. The market entry of a generic drug is controlled by both "the timing of generic approval applications and the length of time for processing such applications" (King & Kanavos, 2002, P. 463). Hence, a number of studies have reflected on the positive impacts of the Drug Price Competition and Patent Term Restoration Act (1984), known as Hatch-Waxman legislation, and its impact on improving the generic market in the USA and other countries afterwards (Kaplan et al., 2012; Rana & Roy, 2015).

Additionally, a vast literature has evaluated the public health aspects of the IPR; and praised the opportunities to overcome the monopoly advantage of patents via the TRIPS agreement and its flexibilities (e.g., 'compulsory licensing,' 'Bolar provisions', 'pre/post opposition proceedings); as argued by Chaves & Oliveira (2007); Rovira, Abbas & Cortés (2009); Akaleephan et al. (2009); Kessomboon et al. (2010); Babovic & Wasan (2011).

Another supply-side measure is 'pricing regulations.' Countries with well-established generic pharmaceutical markets may or may not impose *regulations on pharmaceutical prices*. King and Kanavos (2002) reviewed the pricing regulations in a number of countries, they postulated that while countries may or may not have regulatory arrangements for controlling the price of new medicines, such as USA and Germany, where no price ceilings are imposed; contrary to France, Canada, the Netherlands, Denmark, and Italy, where various regulatory arrangements are in place controlling the prices of new pharmaceuticals.

Arguably, many countries do have regulatory provisions to control the price of generics, such as: Italy, France, Canada, and the UK. Countries such as France, "stipulate that prices of generics should be 30% lower than the equivalent branded product" (King & Kanavos, 2002, P. 464). In Canada, "new generic drugs will come onto the Formulary at a maximum of 70% of the price of the originator drug; the second and subsequent products will be added at a maximum 63% of the original cost" (King & Kanavos, 2002, P. 464). On the other hand, countries such as the USA do not regulate the prices of generics and leave it to the market dynamics.

Policies impacting the demand for generic medicines, as elaborated by (King & Kanavos, 2002), may be explicitly imposed to elicit a response from physician, pharmacists, and/or patients, such as generic prescribing and generic substitution policies; or implicitly encouraged through

packages of incentives directed at physicians, pharmacists, and/or patients. Physician and pharmacist are usually targets of financial incentives, while the way to influence patients is through a system of cost-sharing that favors generic medicines. Generally, cost sharing policies were found to reduce the consumption of prescription drugs, and to have promising results in encouraging patients towards the further use of generic medicines (Gibson, Ozminkowski & Goetzel, 2005).

An explicit incentive to contain cost, and encourage prescribing generic medicines is through the use of *physician budgets,* where the incentives may be structured to reward physicians who underspend or penalize those that overspend. (King and Kanavos, 2002; Babar et al., 2014). *Pharmacists' reimbursement and profits margins policy* is another incentive recognizing that pharmacist margins and discounts typically provide incentives to dispense one drug versus another; Regulating the margins, therefore, can influence pharmacists' dispensing practices. As argued by King and Kanavos (2012), experience from the European Union (EU) suggests that most member states are now remunerating pharmacists on the basis of regressive margins, that pays pharmacists a greater percentage of the cost on lower priced pharmaceutical, provided that the structure of the regressive margins is such that ensures profitability for generic dispensing.

Another potential financial incentive for pharmacists is to allow them to keep some or part of the discounts that accrue from dispensing cheaper products. The Netherlands, as described by Garattini & Tediosi (2000), is an example of a system that rewards cost conscious dispensing; according to the Drug Reimbursement Scheme of 1991, pharmacists are allowed to keep one-third of the savings achieved via the use of less costly generic substitutes.

A potential significant policy tool in increasing the market share of generic medicines is *'Generic Substitution,'* where the pharmacist is authorized, and in some cases required, to dispense the cost-effective generic version of a medicine even when the physician has prescribed it by brand name. Generic substitution is positively encouraged and enforced in a number of countries; US, Canada, Denmark, Germany, the Netherlands (King & Kanavos, 2002). Both Sweden and Finland applied mandatory generic substitution since 2002 and 2003, respectively, in both countries the Medical Products Agency (MPA) produces a list of therapeutically interchangeable products to guide the process of generic substitution (Hassali et al., 2014).

Although the policy of allowing generic substitution is prevalent in a number of countries, Campbell, Bateman, Lee, Smith & Beaney (1995) and (Hassali et al., 2014), divergently, argued that

generic substitution is not a necessary and sufficient condition for high generic use. They explained that the UK is unique in achieving a high level of generic drug use despite not employing a policy of generic substitution. In contrary, the UK policy is focused on using generic drug names in medical education programs, hence, setting in place a prescribing behavior over the career of the physician with substantial impact on increasing generic prescribing; in 2008, more than 83% of prescriptions in general practices were written for generic names (Department of Health, 2009).

The policies described above are often used in combination to facilitate a high prevalence of generic pharmaceuticals, additionally, "different complementary policies and initiatives were necessarily introduced to effectively and successfully implement the main policy" (Hassali et al., 2014, P. 491). These might include: mass education efforts, advertising to promote generic medicines, free generic medicine trials, administrative forms and medicines use review, and greater communication, between patients and health care professionals, which was seen as major influences on the uptake of generics among consumers." (Hassali et al., 2009; Babar et al., 2014).

King and Kanavos (2012) concluded that "systems that either facilitate early market entry of generic pharmaceuticals, or put in place financial incentives for their use, are best able to achieve the dual aims of increasing the consumption of generic drugs and creating a competitive market in which substantial differences in prices exist between the generic and branded, originator versions of a pharmaceutical product" (P. 467).

While there is a large body of research on pro-generic medicine pharmaceutical policies in the United States and Europe and their impacts; there is clearly a paucity of relevant impact evaluations of the pro-generic policies in LMICs, where the comparable literature appeared much less systematized and mostly descriptive. Kaplan et al, (2012) highlighted that "there is little policy evaluation to determine which pro-generic policies increase generic medicines utilization in LMICs." (P. 211). Therefore, while it is recommended to adapt and learn from the policies implemented in the developed and industrialized countries, it is critical to take into account the local conditions in order to guarantee acceptance and ensure performance.

2.3.3. Barriers to the Implementation of Pro-Generic Medicines' Policies:

A number of authors have recognized the different barriers to generic medicines' use, such as Kaplan et al. (2012), Hassali et al. (2014) and (Kaplan & Wirtz, 2014). Different barriers were

highlighted in the different countries; from negative perceptions about generic medicines to lack of a coherent generic medicine policy.

A systematic review of the relevant literature on the policies to promote the use of generic medicines, and the barriers to their implementation, was provided by Kaplan et al. (2012). The review highlighted that there are several barriers to encouraging wider use of generic medicines in the health systems. The main barriers facing pro-generic medicines policies are, primarily, legal and regulatory barriers, institutional and managerial, others are financial barriers, and, finally, there are behavioral and perceptual barriers.

Legal barriers were associated with regulatory and intellectual property policies that tend to slow the market entry of generics; one of the most intractable barriers is the IPR/TRIPS/FTAs and access to medicines narrative (Kaplan & Wirtz, 2014). Other legal barriers include the pricing, purchasing and dispensing regulations which disincentives providing generic medicines.

Managerial and institutional barriers, as explained by Kaplan et al. (2012), were manifested in the low availability of high quality generics in certain public sectors, poorly managed generic advocacy programs, lack of prospective monitoring and retrospective evaluation of the impact of generic medicine policies, and informational asymmetry between producers and consumers of medicines regarding price and quality.

Financial barriers to the uptake of generic medicines, as underlined by Kaplan et al. (2012), are those which similarly cause or augment existing misalignments among stakeholders, such as low salaries for prescribers and dispensers, ownership of pharmacies by physicians, perverse economic incentives caused by low mark ups for the dispensing of generic medicines, or dispensing fees as a fixed percentage of price. In a convergent way, it was earlier highlighted that stakeholders' behaviors are '*misaligned'* all along the pharmaceutical value chain, especially among the physicians and pharmacists with regard to wholesale, retail and consumer prices (Yadav, Curtis & Sekhri, 2006).

Finally, behavioral and perceptual barriers, relating to the perception and knowledge regarding generic medicines, and often involve the notion and perception that low price equals low quality (Kaplan et al., 2012; Kaplan & Wirtz, 2014; Dunne & Dunne, 2015). This psychological barrier was significantly highlighted in Waber, Shiv, Carmon & Ariely (2008) study, where the strength of a placebo-derived response was greater when the medicine was perceived by the patients

as more expensive. Additionally, Dunne & Dunne (2015) reported that both healthcare providers and patients face generic medicines with skepticism, where they do not feel quite trustful in generic medicines.

Unfortunately, the perceptual barriers against generic medicines is also evident among healthcare professionals (physicians and pharmacists), who despite their knowledge of the comparable quality and therapeutic equivalency between the generic and the originator branded medicines, and awareness of the role of generic drugs in the improvement of global access to medicines; yet Toverud, Hartmann & Håkonsen (2015), in their systematic review of physicians' and pharmacists' perspectives on generic drug use, highlighted marked differences regarding how these health professionals view the quality of generic medicines depending on the maturity of their country's healthcare system.

Among the different identified barriers, Kaplan et al. (2012) concluded that the key barriers to implementing generic medicine policies, especially in LMICs, are negative perceptions of stakeholders (physicians, pharmacists and patients) plus perverse private sector financial incentives to sell products with the highest profit margin. Other relevant barriers are legal/regulatory, such as the absence of generic prescription and/ or substitution regulations.

2.3.4. Recommendations to Improve Generic Medicines' Use:

The demand side measures were highlighted in the literature as both: significantly important measures to enhance and improve generic medicines' use; as well as an obstacle facing major countries and threatening the success of their pro-generic policies, especially that they were found to be 'largely neglected in terms of policy and evaluations' (Kaplan et al., 2012, P.219). Therefore, it is highly recommended, as argued by (Ensor & Cooper, 2004), (Kaplan et al., 2012), Dylst, Vulto & Simoens (2013) and Moe-Byrne, Chambers, Harden & McDaid (2014), to target the physicians, pharmacists, and patients using financial incentives together with educational intervention and audit/feedback.

Based on the recognized barriers to promoting generics' use, Kaplan et al. (2012) recommended three over-arching enabling and promoting conditions: (1) a trusted medicine regulatory authority (MRA/ NRA), (2) a robust market for generics; and (3) the alignment of the pro-generic medicine incentives of prescribers, dispensers and patients as well. Kaplan et al. (2012),

additionally, highlighted that policies informed by these conditions should be implemented in an incremental manner and should be monitored and evaluated before they are implemented for the long-term; these policies are necessary, but may be not sufficient.

A trusted, functioning, and reliable medicine regulatory authority (MRA/ NRA), should provide stakeholders with the knowledge and trust that marketed generic medicines are of assured quality; hence, trusting the MRA will help overcoming the low price, low quality stigma. It is widely acknowledged that unless stakeholders believe a generic medicine is a quality medicine, generic medicine policy implementation of any sort will be challenging.

Public educational campaigns have been reported to impact consumers' perceptions that generic medicines are not of inferior quality and there seems to be a positive effect on the uptake of generic medicines thereafter (Godman et al., 2010b; Sheppard A., 2011; Faden, et al., 2011; Kaplan et al., 2012 and Babar et al., 2014). Furthermore, it was reflected that that a less comprehensive educational campaigns may not fulfil the educational purpose and might have a minimal impact (Simoens & De Coster, 2006; and Kobayashi, Karigome, Sakurada, Satoh & Ueda, 2011b). Therefore, it is significant for public educational campaigns to be widely comprehensive and to be supervised and enforced through a trusted NRA.

A robust market for generics is mainly enforced through their ensured quality and policies to ensure suitable pricing as well as effective implementation of the so-called 'TRIPS flexibilities.' Additionally, Kaplan et al. (2012) argued that creating and implementing universal health coverage may stimulate a generic medicines market, especially in LMICs.

Finally, policies designed to align the interests and the pro-generic medicine incentives of all the relevant stakeholders (prescribers, dispensers and patients) are crucial, particularly in countries where the large majority of funding for medicines is out-of-pocket. Therefore, in such contexts, consumers would have a much more important role than in many developed countries where insurance is the main agent financing medicines and hence, the main driver of the type of medicines consumed.

2.4. Knowledge, Perceptions, and Attitudes towards Generic Medicines: Patients 'Lay Public' Perspective

As reviewed earlier, the literature pertaining to the topic of generic medicines, and their

increased use, has been approached mainly and deeply from an economical perspective (Shafie & Hassali (2008); Cameron et al. (2009); Coombes (2009); Cameron et al. (2012); Hassali et al. (2014); Rana & Roy (2015)); and less relevance was given to peoples' ideas and their beliefs about generic medicines. However, over time, more literature has started to develop on the knowledge and perceptions of physicians, pharmacists and patients about generic medicines. Positive knowledge and perceptions of generic medicines were emphasized as necessary prerequisites to the increased and promoted use of generic medicines and their acceptability (Vallès et al., 2003 and Dylst et al., 2013), although "knowledge and awareness do not translate directly into acceptance, and, therefore, use" (Babar et al., 2014, p. 286).

Such emphasis was concomitant to the emergence of a new view of healthcare, in which patients were expected and encouraged to take a more active role in their healthcare and treatment decisions; and a greater involvement for patients in making decisions about their medication has been advocated (Horne, 1999; Garfield, Smith, Francis & Chalmers, 2007). As argued by Almarsdóttir & Traulsen (2005d), in their pharmaceutical policy series, patients are the main users of medications, hence "[their]experience and perspective, is a crucial source of knowledge for decision makers and policymakers" (P. 276). Therefore, the perspective of patients and medicine consumers as end users of generic medicines became an important factor to enhance the use and utilization of these medicines.

The literature, also, highlighted that various terms were used to refer to medicine users, where "the term patients or medicine users refers to individuals with a particular diagnosis who belong to a particular group (for example people suffering from chronic illness such as asthma or HIV). However, in the context of pharmaceutical policy – the principles guiding decision making in this field – the broader terms laypersons, lay public and citizen are used" (Almarsdóttir & Traulsen, 2005d, P. 273).

Different studies have evaluated the knowledge and awareness levels of the public about the concept of generic medicines, and investigated patients' perceptions and attitudes towards generic medicines' use. A systematic review of the patients' and consumers' knowledge, perceptions, acceptance, and views of generic medicines in the current literature was provided by Hassali, Shafie, Jamshed, Ibrahim & Awaisu (2009) and Alrasheedy et al. (2014). They cited a number of studies reporting a lack of knowledge or unawareness or insufficient information about generic medicines

among many medicine consumers. Patients in different countries, over time, showed mixed reactions and divergent views towards the use of generic medicines. Many studies, reported in the literature, cited misconceptions and negative perceptions about generic medicines on the part of patients and medicine consumers. These misconceptions and negative perceptions were reported as major obstacles to the use and acceptance of generic medicines among patients. Besides, Hassali et al. (2009) and Keenum et al. (2012) have reported an upward trend in patient knowledge and confidence toward the use of generic medicines over the past four decades, especially in the developed countries.

Positively, the level of knowledge about generic medicines is an important factor for the acceptance and use of generic medicines. Moreover, it was successfully established, as concluded by Hassali et al. (2009) and Alrasheedy et al. (2014), that different important factors affect a patient's decision to use a generic or a brand medicine, mainly: the type of medical condition and its level of seriousness or severity, recommendations by health care professionals, price difference, prior experience of generic medicines, country development level, consumers' socioeconomic characteristics, pharmaceutical policy environment and reimbursement system.

An important critical point to consider is that the majority of studies, concerning patients' knowledge, perception, and attitudes towards generic medicines, were in the context of developed countries, hence, it was argued that "more research about consumers' views on generic drug products should be carried out in developing countries, where cost savings are needed more than in developed countries" (Hassali et al., 2009, P. 87). They also recommended that researchers should consider studying the "consumers' decision-making processes regarding generic medications" (Hassali et al., 2009, P. 87).

2.4.1. Understanding the term 'Generic Medicine':

Different studies reflected that the term 'generic medicine' is not commonly used, nor familiar to patients and medicine consumers, mainly in countries such as: Malaysia, Iraq, Japan, Australia and Jamica (Hassali, Kong & Stewart (2005); Gossell-Williams & Harriott (2007); Al-Gedadi, Hassali & Shafie (2008); Babar et al. (2010); Kobayashi, Karigome, Sakurada, Satoh & Ueda (2011); Sharrad & Hassali (2011)).

In other countries, such as UK and Portugal, the term has higher familiarity, where a high percentage of participants reported that they understood the terms "brand medicine" and "generic

medicine." (Al Ameri, Whittaker, Tucker, Yaqoob & Johnston, 2011; Quintal & Mendes, 2012). It was also highlighted that reporting understanding or familiarity with the term by patients does not necessarily mean that they have a correct understanding of the concept of generic medicines and can differentiate between brand and generic medicines (Al Ameri et al., 2011).

Additionally, the literature discussed that, in some countries, patients (public) used other terminology to describe the 'generic' medicine. For example: in Iraq, as reported by Sharrad & Hassali (2011), the term "Tejari" (commercial) medicine is used to describe generic medicines, and the term "Asli" (original) to describe brand medicines. In Malaysia, Thomas & Vitry (2009) reported that participants described generic medicines as cheaper brands, non-original and non-genuine, or local medicine. In Australia, Hassali et al. (2005) reported that almost all medicine consumers interviewed referred to generic medicines with the term 'cheaper brand.'

2.4.2. Understanding the concept of 'Generic Medicine':

Understanding the concept and the technical definition of generic medicines—a medicine that contains the same active ingredient(s) (API) and the same concentration (amount) as the original brand, but may contain different excipients leading to different color and flavor; generics are marketed under a different trade name by a different company); generic medicines are therapeutically and clinically interchangeable, and with the same efficacy, safety, and quality as the original brand—was explored and reported in many studies, across several countries.

The literature reviewed highlighted a lack of knowledge in the understanding of the concept of generic medicine among high percentage of participants, where there is still a considerable proportion of patients and consumers who lack adequate knowledge or have insufficient information about generic medicines, in many countries, including: Australia, Malaysia, Japan, Iraq, Norway and Bulgaria (Hoshi & Kimura, 2008; Thomas & Vitry, 2009; Babar et al., 2010; Kobayashi et al., 2011; Sharrad & Hassali, 2011; Toverud, Røise, Hogstad & Wabø, 201; Lebanova, Manolov & Getov, 2012). On the other hand, Al Ameri et al. (2011) and Quintal & Mendes (2012) reported a higher knowledge and awareness levels among participants in the UK and Portugal.

2.4.3. Perceptions, Presences, and Attitudes towards Generic Medicines:

In general, it was established, as described by Figueiras et al. (2009), that the level of knowledge influences the attitudes and beliefs about particular types of medicines and their

contribution for outcome. However, despite knowledge, people might have different opinions about generic medicines, Babar et al. (2014) reported that "awareness does not translate directly into acceptance and therefore use" (P. 286).

Many studies in the literature showed that medicine consumers, still, prefer original brand medicines rather than generic versions; and that generic substitution was not perceived as an equal alternative to branded drugs by a significant proportion of patients (Sansgiry, Bhosle & Pope, 2005; Bertoldi, Barros & Hallal, 2005; Hoshi & Kimura, 2008; Shrank, Cox, Fischer, Mehta & Choudhry, 2009; Keenum, DeVoe, Chisolm & Wallace, 2012; Lebanova et al., 2012; Ibrahim, McKinnon & Ngo, 2012; Sewell, Andreae, Luke & Safford, 2012)

In USA, as argued by Shrank et al. (2009), Keenum et al. (2012), and Sewell et al. (2012) most patients were aware of the benefits and value of generic medicines as having comparable safety and efficacy with the original brand medicine and being less expensive. However, this knowledge and awareness were not translated into a preference for generic medicines, where the majority of participants would not take generic medicines instead of the original brand medicines as reflected by Keenum et al. (2012) in his study title; 'generic medications for you, but brand-name medications for me.' Similar findings were also reported by Lebanova et al. (2012) in Bulgaria, Ibrahim et al. (2012) in Australia, Bertoldi et al. (2005) in Brazil, Hoshi & Kimura (2008) in Japan were most participants indicated that they would use brand medicines rather than generic medicines if they could afford their cost.

A large body of literature has reported negative perceptions and misconceptions about generic medicines among medicine consumers and patients, the percentage of consumers with such misconceptions varied widely from one country to another.

In USA, Shrank et al. (2009) and Sewell et al. (2012) reported that patients believe that generic medicines are less effective, less potent, and might produce more side effects. Therefore, most of them were hesitant to use generic medicines and would use original brands whenever affordable. According to Shrank et al. (2009), 30% of the participants agreed that original medicines are more effective than their equivalent generic versions, and less than 10% felt generic medicines to be less safe than the original brands.

In Spain, Sicras-Mainar & Navarro-Artieda (2012) found out that 66.8% of participants considered generic medicines to be of the same quality as brand medicines, while 42.3% agreed that

generic medicines produce more side effects and only a few (36.1%) agreed that generic medicines take the same time to produce their therapeutic effects. In Bulgaria, Lebanova et al. (2012) found out that almost 94% of participants believed that generic medicines are inferior in terms of quality, safety, and efficacy compared with brand medicines. In Malysia, many participants reported that generic medicines are of lower quality (38.9%), are less effective (34.8%), and produce more side effects (31.2%) (Al-Gedadi et al., 2008).

Generally, patient confidence and knowledge pertaining to generic medicines use have increased over the past four decades, especially in developed countries (Hassali et al., 2009 & Keenum et al., 2012). In a pilot national survey conduct in USA in 2014, Kesselheim et al. (2016) assessed patients' perceptions and use of generic drugs, and compared it to earlier surveys (Shrank et al., 2009 & Sewell et al., 2012). He concluded that "a substantial shift towards more patients having positive views of generic drugs (Kesselheim et al., 2016, P. 609).

2.4.4. Factors Affecting the Acceptance of Generic Medicines; and the Decision to Use them:

In addition to patient knowledge, views and perceptions of generic medicines, other important factors were reported, and highlighted in a number of studies, that affect a patient's attitude (preference) and decision to use a generic or a brand medicine.

The severity of the medical condition was reported as being a factor influencing the choice to use generic medicines. Many studies in the literature have addressed how the type of medical condition and its level of severity affect patient acceptance of generic medicine, consumers were more willing to use generic medicines for mild conditions (eg, headache, fever, allergies and cold) but were less likely to use them for more serious diseases, such as hypertension, diabetes, cancer. (Ganther & Kreling (2000); Gaither, Kirking, Ascione & Welage (2001); Al-Gedadi et al. (2008); Figueiras et al. (2009); Hassali et al. (2009); Figueiras, Marcelino & Cortes (2008); Denoth, Pinget & Wasserfallen (2011); Al Ameri et al. (2011); Sewell et al. (2012); Keenum et al. (2012)).

A strong evidence in the literature emphasized that both physicians and pharmacists play an essential role in the promotion of generic medicines and patients' acceptance of their use and generic substitution. In Spain, Sicras-Mainar & Navarro-Artieda (2012) found out that the vast majority of medicine consumers (81.8%) surveyed would take generic medicines if prescribed by their

physicians. In other countries, such as New Zealand, Malaysia, Finland, Norway and Japan, the majority of medicine consumers would accept generic medicines based on recommendations of a physician or a pharmacist (Babar et al. (2010); Al-Gedadi et al. (2008); Heikkilä et al. (2007); Kjoenniksen, Lindbaek & Granas (2006); Kobayashi et al. (2011b)). Moreover, Quintal & Mendes (2012) highlighted that in many countries physicians have a relatively more influential role than pharmacists in convincing patients to use generic medicines.

Other factors that also affect a patient's decision to use a generic or a brand medicine, as highlighted by Hassali et al. (2009) and Alrasheedy et al. (2014), in their systematic literature review, include: price difference, prior experience of generic medicines, country development level, consumers' socioeconomic characteristics, pharmaceutical policy environment, reimbursement system, and trust in regulatory authority.

Additionally, the willingness and acceptability to switch to a generic medicine were found to be associated with the consumers' socioeconomic characteristics, such as: old age and lower level of education (Figueiras et al., 2009).

The trust in the regulatory authority—with regard to the equivalency of both brand and generic counterparts and their abilities to address the increased pharmacovigilance mandates that generic promotion requires (Dunne & Dunne, 2015)—does not only affect patients' perception and decision towards generic medicines; it, significantly, influences physicians view and trust in generic medicines. In their systematic review of literature pertaining to physicians' and pharmacists' perspectives on generic drug use, Toverud, Hartmann & Håkonsen (2015) highlighted how physicians and pharmacists are generally aware of the impact of generic medicines in the improvement of global access to medicines. Nevertheless, there are marked differences regarding how these health professionals view the quality of generic drugs depending on the trust in their country's regulatory authority and maturity of the healthcare system.

In general, the provision of information and education, in the areas of equivalency and regulation, particularly for physicians, has been argued by Dunne & Dunne (2015) as a key factor in enhancing the confidence of both patients and physicians towards generic medicines. Hence, promoting usage and acceptance of generic medicines.

Conclusion:

Reviewing the literature has painted a clear picture on how economic recessions put aggravated challenges on the realization of the planned health and pharmaceutical policy goals. Economic downturns have both direct and indirect effects on the health status of the population(s); it instigates a lowered access to health care, leading to a fall in health service utilization, with negative impacts on the availability and affordability of medications and severe decline in the pharmaceuticals' expenditure and consumption.

The literature has cited several pharmaceutical policies implemented, in different countries, during, or after, economic downturns. These policies pertain to three main domains; pricing related policies, cost containment and reimbursement policies, and generic medicines policies. It was emphasized that promoting the use of generic medicines is an effective policy intervention that has a key role to play in the efficient allocation of the financial resources for pharmaceuticals.

Promoting the use of generic medicines has been reviewed, in the literature, embracing different dimensions. First, their quality, therapeutic equivalency, cost, impact and use. It was emphasized through the literature that generic medicines have comparable quality and equivalent therapeutic effectiveness to the branded original products; additionally, it is estimated that generic medicines are 20–90% cheaper than their counterpart innovator brands. Hence, their impact manifested as a cost-effective way to improve access and affordability to medications, contributing to the achievement of a comprehensive and sustainable healthcare system. The used of generic medicines have increased all over the world, where they became the 'gold standard' and 'first-line therapy' for many acute and chronic diseases, mainly in USA and Europe.

Second, the main policies and strategies implemented in different countries to promote the use of generic drugs; where evidence from several industrialized and developed countries points towards the importance of policy tools and strategies to facilitate ease of entry into the market for generic pharmaceutical manufacturers as well as policies to influence market demand that relate to interventions at prescribing and dispensing levels as well as purchasing by consumers (patients).

Third, the barriers facing the implementation of pro-generic policies; where the reviewed literature identified legal and regulatory barriers, institutional and managerial barriers, financial barriers, and, finally, behavioral and perceptual barriers. The key barriers facing pro-generic

policies, especially in LMICs, were highlighted in different resources to be the negative perceptions of stakeholders (physicians, pharmacists and patients) plus perverse private sector financial incentives to sell products with the highest profit margin; other relevant barriers were legal/regulatory, such as the absence of generic prescription and/ or substitution regulations.

Fourth, recommendations to improve generic medicines' use; where the demand side measures were emphasized in the literature as both: significantly important measures to enhance and improve generic medicines' use; as well as an obstacle facing major countries and threatening the success of their pro-generic policies; especially that they were found to be 'largely neglected in terms of policy and evaluations.' A trusted medicine regulatory authority (MRA/NRA), mass educational efforts, financial incentives, and greater communication among patients and health care professionals were seen as major drivers to the uptake of generic medicines among patients and medicine consumers.

Over time, and with the emergence of a new view of healthcare, in which patients were expected and encouraged to take a more active role in their healthcare and treatment decisions, positive knowledge and perceptions of generic medicines' use were emphasized as necessary prerequisites to the increased and promoted use of generic medicines. Hence, the literature review was concluded with an extensive review of the studies assessing and investigating patients and consumers' knowledge, perceptions, and views of generic medicines, in different countries, and over time.

A large body of literature has reported a lack of knowledge or unawareness or insufficient information about generic medicines among many medicine consumers. Patients in different countries, over time, showed mixed reactions and divergent views towards the use of generic medicines, where misconceptions and negative perceptions about generic medicines were largely cited in different studies. As concluded in a number of studies, the available literature on generic medicines, their promoted use, and patients' knowledge, perception, and attitudes towards their use is quite limited and further work is required to develop a range of interventions that support the uptake of generic medicines within and across different countries, especially that the majority of the reviewed studies were in the context of Europe and USA. Therefore, more research about consumers' views on generic medicines is advised in developing countries, where cost savings are needed more than in developed countries.

The comprehensive review of the available resources confirmed the significance of the proposed study, as the majority of the reviewed studies were in the context of Europe and USA, very limited and rare studies were found in the context of the LMICs, and the Middle Eastern countries, additionally, the review did not yield enough sources about pharmaceuticals and generics in Egypt from a social perspective, specifically discussing the knowledge, perceptions, and attitudes of the Egyptian patients towards the use of generic medicines. Hence, there is a valid reason to believe that the literature about this topic is scarce given the Egyptian context.

Chapter Three: Conceptual Framework

As highlighted earlier, a new view of healthcare has recently emerged, in which patients were expected and encouraged to take a more active role in their healthcare and treatment decisions; and a greater involvement for patients in making decisions about their medication has been advocated (Horne, 1999; Garfield et al., 2007). Besides, given the Egyptian context, the boundaries, between prescription and OTC medicines, are blurred; and all medication can be dispensed from community pharmacies without the need to have a physician prescription[13].

Therefore, the process of buying a medication, originator or generic one, can be highly comparable to any other consumer goods. Hence, the consumer's decision making process and behaviors regarding generic medications can be conceptualized using the different consumer behavior theories, whether economic, psychological, or socio-cultural theories.

Economic theories, such as; consumption theory of revealed preference of P.A. Samuelson, and the Income theory, highlighted that "the tendency that when income increases, consumption also increases, but not to the same extent as the increase in the income" (Roszkowska-Hołysz, D., 2013, p. 335). Economic determinants are reflected in the conceptual framework as "Income level," "Price," and "Out-of-pocket expenditure."

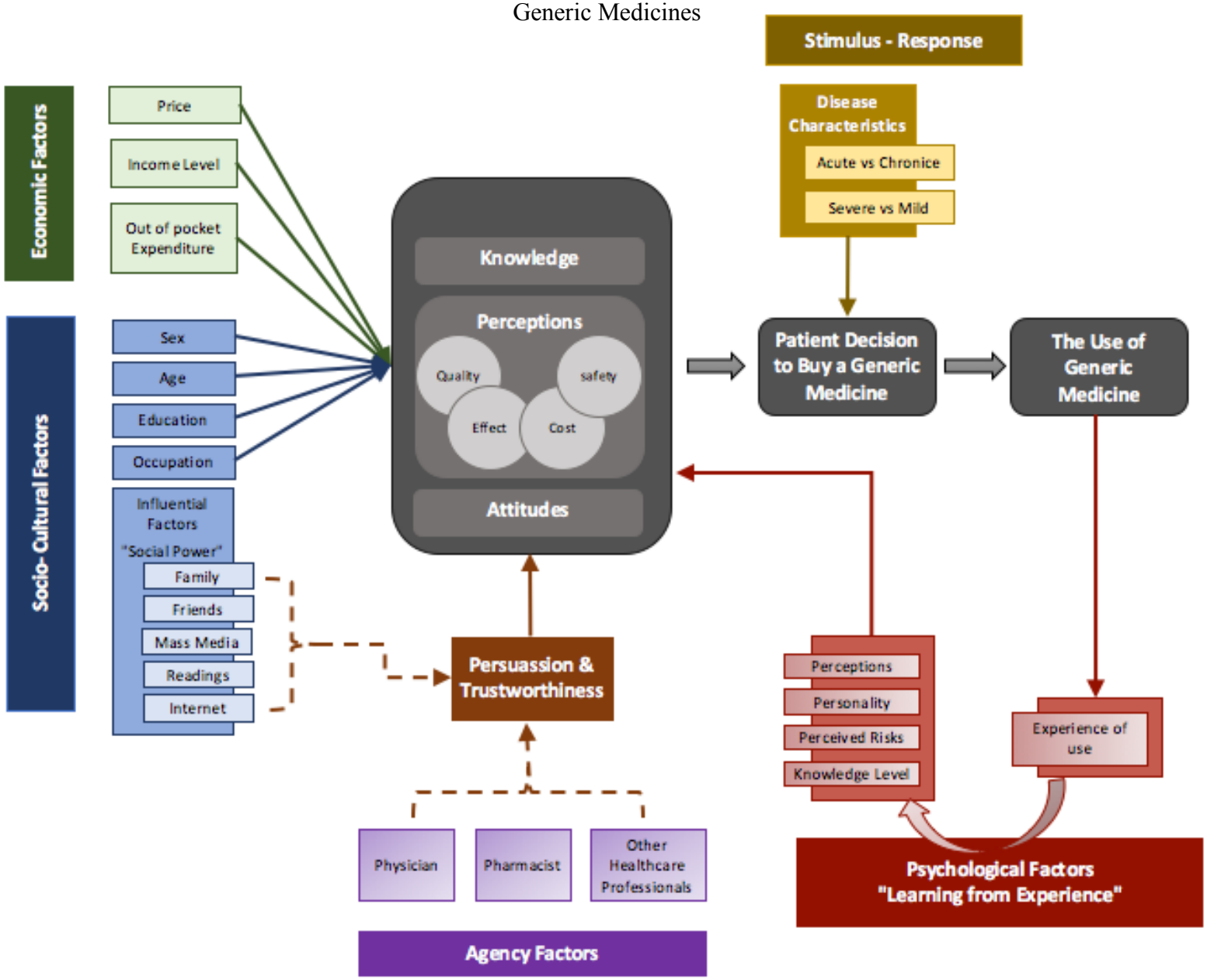
Psychological theories or learning theories focuses on the fact that people learn from experience and the results of experience will modify their actions on future occasions. Additionally, attitudes, preferences, personalities, knowledge levels, and perceived risks associated with purchasing are all important psychological determinants (Roszkowska-Hołysz, D., 2013, p. 340). Therefore, Psychological determinants are reflected in the conceptual framework as "Experience of use," "Perception," "Personality," "Perceived risks," and "Knowledge."

Socio-cultural theories, mainly the "Veblenian Model" (Veblem, T.,1899 as cited in Kotler, P.,1965, p.43), asserted that "a man is primarily a social animal and his wants and behaviors are largely influenced by the group of which he is a member." Therefore, socio-cultural determinants include; "Age," "Occupation," and "Influence of family, friends, etc."

[13] Except medications affecting the central nervous system and those leading to addiction 'controlled medicines' (as discussed earlier)

Additionally, other theories, such as agency theory, theory of persuasion, stimulus-response theory, and theory of social power, contribute significantly in the determination of the consumer (patients) behavior towards generic medicines use (Murshid, M. A., & Mohaidin, Z., 2017). Additional determinants include: "Influence of physician, pharmacist, other healthcare member," "Persuasion and trustworthiness of the different influencers," and "Disease characteristics," respectively. All the previously mentioned theories and determinant factors paint the picture of the conceptual framework; figure (6) illustrates its graphical representation.

Figure (6): Conceptual Framework of Factors Influencing Patient Behavior (Knowledge, Perception and Attitudes) towards the Use of Generic Medicines



Source: Author's Conceptualization based on; Veblem, T.,1899 , Roszkowska-Hołysz, D., 2013 and Murshid & Mohaidin, 2017

Based on the conceptual framework, the patient's behavior or decision to buy, and use a generic medicine, is influenced by; (1) *Knowledge*, defined as "the understanding of the concept and technical definition of a generic medicine, mainly, being therapeutically and clinically interchangeable, with the same efficacy, safety, and quality, as the originator brand" (Alrasheedy et al., 2014). (2) *Perception*, defined as "the way in which something is regarded, understood, or interpreted" (Merriam Webster, n.d.), hence, for the purposes of this research, *it* is "the views and opinions expressed from the respondent concerning the effectiveness, safety, quality, and cost of generic medicines." (3) *Attitudes*, defined as "the tendency to respond positively or negatively towards a certain idea, object, person, or situation. Attitude influences an individual's choice of action, and responses to stimuli (challenges, incentives, and rewards)" (Business Dictionary, n.d.), hence, for the purpose of this research, it is "the willingness of a respondent to use a generic medicine, the factors and conditions that might affect this willingness."

Patient behavior can be influenced by the *socio-cultural and demographic factors*, such as: sex, age, level of education, occupation, and social power of family, friends, etc; and the economic factors, such as: income level, medicine's price, and out-of-pocket expenditure.

Given the special characteristics of healthcare, the agency theory plays a central role in the use of medicines in general, and, expectedly, the originator versus generic ones. Therefore, the *persuasion and trustworthiness of the healthcare providers' advice* as well as social power of friends and family, also, influence the patient's decision to buy and use a generic medicine.

Moreover, the *experience of prior use* impacts the perceptions of quality, safety, and effectiveness. Thereafter, it influences the patient's decision to buy and use a generic medicine.

Certainly, the patient's decision to buy (use) a generic medicine is stimulated by a need, "a disease;" which may be acute or chronic disease, and severe or mild disease. These *disease characteristics* influence the decision whether to buy a generic or originator medicine, as well.

Chapter Four: Research Design

4.1. Research Paradigm:

The medical and pharmaceutical disciplines used to be thought of under the umbrella of natural sciences, following the *positivism* paradigm, which holds that scientific research, and, hence the logical and rational knowledge can only be obtained empirically, through the objective use of senses, rather than the subjective reliance on beliefs. However, the proposed research will join the emergent shift in viewing health and medical studies as social constructs, highlighting the importance of human element. Thus, it views knowledge and truth as products of social, historical, and political discourses or interpretations. This contextual and socially constructed view of knowledge highlights the adopted *postmodernism* research paradigm.

4.2. Research Methodology:

The research problem and the research questions can be answered using both qualitative and quantitative methods. The quantitative approach aims at providing a clear-cut, logical, and precise findings and results, where numbers are shorter than words and prevent reverting to ambiguous language (Van Thiel, 2014). Hence, quantitative data can, accurately, describe the phenomenon under study (the level of knowledge of Egyptians about generic medicines, their perceptions and attitudes towards their use), its prevalence among the target population and the different social subgroups, as well as the contributing and determining factors. Additionally, further "analyses can be carried out to mine the available [data and] information for different kinds of patterns and relations between variables, so as to arrive at new theoretical insights" (Van Thiel, 2014, P.119). Nevertheless, sometimes "quantification leads to simplification and a reduction of information, and therefore does not do justice to the complexity of reality (Van Thiel, 2014, P.119).

In a complementary manner, the qualitative approach aims at gathering in-depth understanding of any social behavior (King, Keohane & Verba, 1994) and focus on describing and understanding reality in the context in which actors operate or in which certain phenomenon occur (Van Thiel, 2014). Therefore, using a qualitative method will help to explore patients' beliefs and perceptions towards generic medicines; and generate a valid in-depth understanding and explanation of the captured believes and thoughts.

The reviewed literature has indicated the preference of some researchers to tackle this issue using qualitative methods (Sewell et al., 2012; Hassali, Kong & Stewart, 2005; Bulsara et al., 2010; Sharrad & Hassali, 2011; Toverud et al., 2011), while others used quantitative methods (Ganther & Kreling, 2000; Sansgiry et al., 2005; Al-Gedadi et al., 2008; Shrank et al., 2009; Babar et al., 2010; Keenum et al., 2012; Ibrahim et al., 2012). In addition, the main research question of this research study is an overarching mixed question, which is broken down into separate quantitative and qualitative sub-questions.

Therefore, the study used a "Mixed Methods Approach" (quantitative & qualitative). Such mixed methodology will help to "effectively link the components or strands [qualitative and quantitative] and objectives and questions of the study and sets the stage for comprehensive mixed methods inferences and conclusions at the end." (Tashakkori & Creswell, 2007, p. 120)

The quantitative part employed an observational cross-sectional study; that covers both descriptive and analytical aspects. The qualitative part was employed in two stages; exploratory in the beginning of the research; then, explanatory, afterwards in order to deeply understand the perceptions of patients especially regarding the repeated use of generic medicines, the views and opinions of pharmacists, physicians, representatives from the regulatory health authority and pharmaceutical industry.

4.3. Research Strategy:

A preliminary *preparatory* or *scoping phase* involved pilot interviews conducted with a number of patients (five patients), the main purpose was to better explore the patients' beliefs and perceptions towards generic medicines, and gain some in-depth understanding of the issue. The evolved themes were integrated into the first draft questionnaire for the quantitative part of the study, which was, further, tested, cross-checked and validated by experts before settling up with the final version of the questionnaire.

The research used *surveying* as the core research strategy. Variety of methods, questionnaires, and interviews were used and triangulated to assess the current levels of knowledge, perceptions, and attitudes towards generic medicines' use, and to gain more in-depth understanding of the issue from different perspectives in a holistic approach, including the users (patients), pharmacists, physicians, regulatory body, and the pharmaceutical industry.

4.4. Methods and Study Instruments:

Questionnaires and *interviewing* are the two main methods used in the research.

For the quantitative part, a questionnaire was used as the principle method and instrument for data collection. A structured self-administered questionnaire was developed using the main variables in the conceptual framework, and with reference to published studies identified during the literature review; mainly the ATtitude Towards GENerics (ATTOGEN) questionnaire, an already validated instrument published and used elsewhere (Philip J Domeyer, Aletras, Anagnostopoulos, Katsari & Niakas, 2017; Philippe J Domeyer et al., 2018); and Generic Medicines Scale (GMS) (Figueiras et al., 2009), a reliable and valid measure of patients' belief about generic medicines (Wong, Hassali, Saleem, Yahaya & Aljadhey, 2014). These questionnaires were reviewed to select proper questions that fit the purpose of the study and the Egyptian context. Additional questions were added, as well, in order to cover the themes evolved during the preliminary exploratory interviews.

The questions were carefully phrased and reviewed in order to avoid ambiguity, biases, jargon, double-barreled and double negative questions. Additionally, an Arabic translation of the questions was done by the principle researcher.

A preliminary version of the instrument was handed over to five researchers and experts in the fields of pharmaceuticals and questionnaire construction in order to complete the questionnaire, check the translation, and highlight ambiguous or problematic items. They were, also, asked to propose additional items regarding aspects of a person's attitude towards generic medicines not already captured by the instrument and to delete any trivial items, thus resulting in enhanced content validity and reliability. All necessary modifications, based on divergence of opinions between experts, were made to the instrument, which was subsequently handed over to ten subjects randomly selected from the public (mainly non-pharmacist friends). Again the same procedure was followed, which resulted in only minor textual changes. No additional amendments were required at this stage.

The final version of the questionnaire was in both languages, English and Arabic; and consisted of three parts. Part (I) covered the socio-demographic data of the participant (age, sex, governorate of residence, marital, educational and professional status, the profession was added,

and the income level). Part (II) covered the health profile and spending on medicines, five questions about health insurance, spending on medicines, regular use of medicines for chronic diseases, and frequency of visiting a pharmacy. Part (III) consists of three sections with questions about the knowledge, perceptions, and attitudes towards generic medicines use, respectively. After the first section—knowledge about generic medicines, a *'What is a Generic? Sheet*' was shown so that "participants with no or incorrect knowledge about generic medicines can complete the questionnaire and their responses regarding the perceptions and attitudes could be valid" (Babar et al., 2010, P. 443). The *'What is a generic? Sheet'* explains in simple language (Arabic and English); the definition of a generic medicine, the difference between the generic and the originator (brand); the sheet showed the image of two different types of medicine (innovator brand and counterpart generic medicines).

Responses were scored on a 6-point Likert type scale (1=Strongly Disagree, 2=Disagree, 3=More or Less Disagree, 4=More or Less Agree, 5 = Agree, 6 = Strongly Agree). To rate the scale in a positive fashion, some items were reversed; higher scores indicate a stronger positive belief or good perceptions/attitudes towards generic medicines.

Appendix (III) illustrates the final version of the used questionnaire, with the *'What is a Generic? Sheet.'*

For the qualitative part, interviews were used as "a flexible way of collecting data" (Thiel, 2014, p.93). Some fully structured qualitative questions were included in the questionnaire. Additionally, semi-structured and in-depth interviews were conducted to collect in-depth information and "explore where, [how, and] why policy, local knowledge, and practice are at odds....and elicit tacit knowledge and subjective understandings and interpretations [of the participants]" (Marshall & Rossman, 2011, p.91).

The researcher, as identified to be a main instrument in conducting the interviews, has a pharmaceutical background, professional experience in the regulatory field of pharmaceuticals, and has been trained in research methods as part of a master's degree in Public Policy and Administration at the American University in Cairo. Being a member of the central health authority helped to spot the importance of the research topic, in the first place. And has facilitated the access to focal informants in the regulatory authority and the pharmaceutical industry as well.

4.5. Study Population and Sample:

The main study population is the Egyptian public, above 18 years old (ordinary public, pharmacists, and physicians). Other relevant stakeholders included the health and pharmaceutical regulatory authority (MOHP/EDA) and the pharmaceutical industry (both local and multinational pharmaceutical companies).

For the quantitative part; no sampling framework was available for the public Egyptians; the sample is planned to be a convenience cross-sectional sample from the different Egyptian governorates, covering both sexes, the different socio-economic classes (education, income, marital and professional status), as well as health status, and medication use. The respondents' number was not fixed before data collection, however it was targeted to be around 500 participants, half of them (at least) to be from non-medical personnel (neither pharmacists nor physicians). This number was determined reference to similar studies in other countries, where the sample size in most cases ranged from 200 to around 1,000 participants. Appendix (IV) illustrates examples of questionnaire—based studies investigating patients' perceptions and acceptance of generic medicines in different countries, and the used sample size.

For the qualitative part; patients, pharmacists, representatives from the pharmaceutical industry, and officials from the Egyptian MOHP/EDA were interviewed. A total of twelve interviews were performed. The selection of those interviewees was done *purposively* to ensure maximum possible variation and to cover the different standpoints. *A snowball sampling* was also utilized to facilitate access to different pharmacies and to interview other representatives from the industry. The research involved triangulation in data collection through employing multiple sampling strategies (Marshall & Rossman, 2011). The number of interviews were decided upon during the process of data collection on the basis of theoretical saturation. The researcher stopped conducting interviews once she felt that new data were not bringing additional insights to the research questions.

4.6. Source of Data; Data Collection and Procedure:

For the purpose of this research, primary data were collected from participants recruited from the general public between May and June 2019; where an anonymous *questionnaire* measuring beliefs about medicines and some socio-demographic information was widely distributed via the

internet (social media, email listings, etc.). Other participants were approached by the researcher at work, hospitals, community pharmacies and through different social connections and gatherings. Hence, data were collected from large convenience cross-sectional sample from the different Egyptian governorates. Reminders were sent to the online participants, in order to maximize the response rate.

The criterion for inclusion was that participants were Egyptians and at least 18 years old. The questionnaires were submitted (returned) after completion, and collected by the researcher. The estimated time for filling the questionnaire was twenty minutes.

Moreover, a number of *interviews* were conducted with patients at community pharmacies, where the researcher can face-to-face interact and discuss the respondent, whether a patient or a pharmacist, for pragmatic reasons, the researcher capitalized on her social network of colleague pharmacists, who own or manage community pharmacies, to secure stable environment for conducting the interviews. Additionally, interviews with the MOHP/EDA officials, and the Pharmaceutical Industry representatives were conducted face-to-face at their offices. The interviews lasted around forty minutes. All the interviews are conducted in Arabic language, and later, the interview report was translated back to English. Appendix (V) illustrates the Profile of the Interviewed Participants.

The researcher (interviewer) used an interview guide to maintain objectivity and enhance the reliability and validity of the interview. The respondents (interviewees) were allowed to freely and completely express their opinions and views. During the open interviews, the interviewer introduced the initial question, and, probe, as necessary, to get better clarifications, illustrations, and more details from the interviewee. For all interviews, good note-taking and processing the answers directly after the interview helped to have a reliable interview report, that was cross-checked with some interviewees, “to ensure that the researcher has given a valid representation of the conversation” (van Thiel, 2014, p.99). Appendix (VI) illustrates the used Interview Guide.

4.7. Measures (Data and Variables):

A number of socio-demographic variables were collected for each participant (age, sex, governorate of residence, level of education, income level, work status, and marital status).

Additionally, some variables reflected the health profile and spending on medicines (coverage by health insurance, medicine's cost coverage, monthly average out of-pocket spending on medicines, number of pharmacy visits, and any regular use of medicines for chronic diseases).

The different variables used in the analysis are illustrated in Appendix (VII).

Knowledge:

For the purpose of this research, knowledge was defined as "understanding the concept and the technical definition of generic medicines—a medicine that contains the same active ingredient(s) (API) and the same concentration (amount) as the original brand, but may contain different excipients leading to different color and flavor; generics are marketed under a different trade name by a different company); generic medicines are therapeutically and clinically interchangeable, and with the same efficacy, safety, and quality as the original brand." (Alrasheedy et al., 2014)

Knowledge of generic medicines was operationalized using a number of measurements and variables, as follows:

- (K1): which assess the familiarity with the term generic medicine, and the technically correct Arabic translation '*ganeese'*
- (K2: K10), which assess the correct knowledge of the concept of generic medicine through a number of statements reflecting main ideas and/or misconceptions of generic medicines
- (K_S), a composite scale variable that summarizes the correct knowledge about the concept of generic medicines calculated using the variable K1: K10 (scale from 1 to 10)
- (K_C), an ordinal variable that classifies the level of knowledge of each participant as either having 'Poor Knowledge' (K_S from "0" to "5"); 'Fair knowledge' (K_S from "6" to "8"); and 'Good knowledge' (K_S from "9" to "10").

Perception:

Perception is defined as "the way in which something is regarded, understood, or interpreted" (Merriam Webster, n.d.). Hence, despite knowledge, people tend to have different opinions and thoughts about generic medicines; their effectiveness, safety, quality, and cost (financial impact). Therefore, for the purpose of this research, perception was defined as "the views and opinions expressed from the respondent concerning the effectiveness, safety, quality, and cost of the generic medicines"

The concept of *perceptions* towards generic medicines was operationalized using a number of measurements, in which participants were asked to reflect on their personal opinions and believes, which differ from one to another, and they were assured that there is no right nor wrong answer. The main measurements and variables of *perceptions* towards generic medicines, include:

- (P1, P4, P6, P7, P9), which assess the perceptions towards generic ***effectiveness/ efficacy***; "the extent to which the medicine produces its intended pharmacological effects (treatment)" (PHIS, n.d.)
- (P_E), a composite scale variable that summarizes the perceptions towards generic ***effectiveness/ efficacy***, calculated as the average score of variables (P1, P4, P6, P7, P9), the average was, then, standardized to have a scale from 1 to 10.
- (P8, P11), which assess the perceptions towards generic ***safety***; "the extent to which the medicine produces unintended effects at the normal dosage; known as side effects or adverse drug reactions, ADR" (Global Pharmacovigilance, n.d.)
- (P_S), a composite scale variable that summarizes the perceptions towards generic ***safety***, calculated as the average score of variables (P8, P11), the average was, then, standardized to have a scale from 1 to 10.
- (P3, P5, P13, P14, P15, P17), which assess the perceptions towards generics' ***quality***, and quality assurance (QA) activities; "the arrangements made with the object of ensuring that pharmaceutical products are of the quality required for their intended use" (PHIS, n.d.)
- (P_Q), a composite scale variable that summarizes the perceptions towards generic's ***quality*** and quality assurance, calculated as the average score of variables (P3, P5, P13, P14, P15, P17), the average was, then, standardized to have a scale from 1 to 10.
- (P16), which assess the perceptions towards generics' ***cost and its financial impact*** on the overall spending (expenditure) on medicines; it was standardized to have a scale from 1 to 10 (P_C)
- (P10, P12), which assess the overall trust in generics medicines
- (P1_D: P12_D): the different statements used to assess participant's perception towards generic medicine were recoded into dummy variables. 'agree/disagree' to the statement
- (P_overall), a summary variable for the respondent's perception towards generic medicines

Attitude:

Attitude is defined as "the tendency to respond positively or negatively towards a certain idea, object, person, or situation. Attitude influences an individual's choice of action, and

responses to stimuli (challenges, incentives, and rewards)" (Business Dictionary, n.d.). Therefore, for the purposes of this research, attitude was defined as "the willingness of a respondent to use a generic medicine, the factors and conditions that might affect this willingness."

Attitudes towards generic medicines was operationalized using a number of measurements and variables, which tried to assess the different factors that might impact a patient/medicine user's decision to use (or switch) to a generic medicine, the main variables of *attitudes* towards generic medicines, include:

- (A1, A9); impact of cost (financial factor)
- (A2, A3, A4); type of illness (medical condition)
- (A5); manufacturing status (local or imported)
- (A6); pharmacist advice
- (A7); physician prescription
- (A10); appearance of any side effect
- (A11); the main factor impacting the choice to use (switch to) a generic medicine
- (A1_D: A10_D): the different identified dimensions (variables) influencing the attitudes (decision to use a generic or an originator medicine) were recoded into dummy variables to summarize whether the participants will agree/disagree to use a generic medicine
- (A_overall): a summary variable to the attitude of the participants towards using a generic medicine under the different influential factors; A_overall is the sum of variables (A1_D:A10_D)[14]

4.8. Data Analysis:

The data analysis was done to mirror the conceptual framework, where the research aims to study the patient behavior as a function of knowledge, perceptions of effectiveness, safety, quality and cost, and finally, the overall attitude towards generic medicines. The main proposed theoretical themes or dimensions included: the socio-cultural, economic and health factors and their relation to the patient behavior, the level of persuasion and trustworthiness towards the different healthcare professionals, and the effect of psychological factors or past experiences on the current behavior. Finally, the patient decision to buy generic medicines was studied in relation to the type of stimulus or disease characteristics.

[14] Variables (A8_D), (A9_D) and (A10_D) were reversed for the purpose of calculating (A_overall), to maintain that a score of (1) reflect using a generic not an originator medicine.

For the quantitative analysis, a total of 601 valid questionnaires[15] (576 submitted online and 25 hard copies) were collected during the data collection process. The data was checked, coded, and entered into SPSS (Statistical Package for Social Sciences) software for statistical analysis.

To assess statistical variation in responses, pearson's chi-square test was used for categorical variables and a one-way analysis of variance (ANOVA) test was used to compare the means of continuous variables among different groups. To assess the association between the level of knowledge, perceptions, and attitudes and the different socio-demographic and health related variables, a multiple linear regression analysis was performed. Three levels of statistical significance were used; P-value < 0.001, referred to as 'significant' and indicated as (***); P-value < 0.01, referred to as 'moderately significant' and indicated as (**); and P-valued < 0.05, referred to as 'slightly significant' and indicated as (*).

For the qualitative analysis, semi-structured and in-depth interviews were conducted in Arabic and translated to English by the researcher. Thematic sorting was performed by the researcher and each interview report was divided into several sections. The analysis of the qualitative data, gathered through the interviews, resulted in some new themes that were not be identified in the theoretical framework, those new themes were incorporated as sub-themes under the given dimensions.

4.9. Computer Package:

IBM SPSS Statistics, version 23, computer package was used for all quantitative data analyses (IBM Corp. Armonk, NY). No computer packages were used for the qualitative data

4.10. Ethical Approval:

The study proposal was approved (May, 2019) by the Institutional Review Board (IRB) of the American University in Cairo. All data collection was performed in the period between May and June 2019; after the IRB approval. Appendix (VIII) shows the IRB Approval.

Ethical approval was sought from each participant, before starting data collection; where participants confirmed their voluntary and informed consent to participate in the study, as part of

[15] A total of 604 questionnaires were collected, however, four consecutive responses were found identically the same, three of them were excluded.

a learning process, and, further, for policy recommendations. The nature and purpose of the research was explained to each participant through the informed consent (Babbie, 2007). Participants were assured that their identity will be kept confidential, and the information (answers) will be analyzed and reported in an anonymous manner.

There was no compensation for the participants, however, the importance of achieving a high response rate was highlighted, as it was explained that all the shared information will help understanding the nature of medicine users, and, hence, improving medicines' policies and medication availability in Egypt. Participation was completely voluntary, where it was emphasized that participants may pertain to answering any question or discontinue participation at any time, where they are completely free to decide whether to complete the questionnaire or not. Appendix (IX) illustrate the template of the informed consent form(s).

The researcher has completely isolated any personal views or perceptions during the interviews to avoid possible bias. In the research context, any personal experiences, opinions, or reflections will be bracketed to "separate the personal insight from the researcher's collection of data" (Marshall & Rossman, 2011, p.97).

4.11. Limitations of the Study:

The current study has a number of limitations that was identified by the researcher, who tried to minimize their impact, nevertheless, they should be reported in order to cautiously interpret the research findings and results.

First, the theoretical population[16] is the whole Egyptian population, however, the accessible population was mainly the educated Egyptians, mostly internet users, where the majority of the responses were submitted online (96 percent of the responses). Internet users, at least can read, therefore, the educational levels (illiterate or did not attend school) was under-represented. Although the researcher tried to target participants belonging to lower educational levels, still, it is important to interpret the results with caution in this regard.

Second, participants from rural areas and frontier governorates were minimal. The majority of participants were from urban area (88 percent); the majority of responses were from

[16] The population that the research is aimed to generalize to

the governorates of Cairo (47 percent), Giza (15 percent), Sharkia (7 percent), Fayoum (4 percent), Souhage (4 percent) and Alexandria (4 percent).

Third, despite the instructions, some of the participants, after reading the '*What is a Generic Sheet*,' returned back and changed their answers regarding the '*Knowledge Questions*,' This was reported from some participants. Additionally, since the data collection tool is a self-administered questionnaire (online form), there is no guarantee that some participants might have referred to any information sources to provide the correct answer. These points indicate that the detected level of knowledge has some upward biases, where the obtained results could have underestimated the true lack of knowledge regarding generic medicines, and among the real population, the knowledge levels are, even, lower than the assessed level in the study.

Fourth, while the questionnaire included a number of questions asking about the attitudes and decisions to use the generic versus the originator medicine, a high percentage of the participants (80 percent) did not actually use medications regularly (did not suffer from chronic diseases). Hence, despite reported answers and chosen attitudes, the decision while in real situation might slightly differ.

Fifth, the title of the questionnaire, and the fact that it is concerned with medicines, was attracting people from medical background, especially pharmacists. Hence, the researcher included a question about the profession[17] in order to set apart participants from medical background and, thereafter, analyze their answers separately.

Finally, the study referred to pharmaceuticals in general and did not reflect on the Narrow Therapeutic Index (NTI) pharmaceuticals. NTIs are a group of medications (drugs) where small differences in dose or blood concentration may lead to dose and blood concentration dependent, serious therapeutic failures or adverse drug reactions, such as warfarin, digoxin, levothyroxine. Those medications have special consideration when it comes to generic substitutions (Paveliu, Bengea & Paveliu, 2011)

[17] The question asks, directly, if the participant is 'Pharmacist,' 'Physician,' 'Other Healthcare Provider' or Other Profession

4.12. Delimitations of the Study:

The scope and focus of the current study applies to the ordinary conventional medicines, manufactured based on chemical synthesis, known as "pharmaceuticals," hence the term generic can apply; it is important to reflect that an emerging line of medications include biological medicines (biopharmaceuticals), which include products such as recombinant proteins, vaccines, blood products used therapeutically, gene therapy, monoclonal antibodies and cell therapy. Biopharmaceuticals are isolated from a variety of natural sources — human, animal, or microorganism — and may be produced by biotechnology methods and other cutting-edge technologies (FDA, 2017b). They represent a special category of medications with different set of regulations and considerations.

A second delimitation pertains to the target population, where the study, primarily, intended to provide an assessment of the lay Egyptian public knowledge, perceptions and attitudes towards generic medicines. However, understanding that a cross-sectional sample of the general public would definitely include medical professionals (pharmacists and physicians), the results of the study differentiated between the two sub-populations; the non-medical participants (lay public) and the medical-professional participants (mainly physicians and pharmacists). The results pertaining to the medical professionals helped to highlight their views and beliefs of these important cost-effective category of medicines, but it must be kept in mind that the overall study design, data collection tool, and, hence, results would provide a robust evidence for the lay public not the medical professionals, where other themes, classifications, and inquiries could have been covered.

Chapter Five: Results and Findings

5.1. Characteristics of the Study Sample:

A total of 601 individuals included in the study. The group was composed of 223 males (37%) and 378 females (63%), with a mean age of 34 years (SD 8.9; range 19–73; median 32; inter-quartile range 28, 32, 37); hence, around half of the participants were in the age range of 30–39.

The majority of the participants were from urban areas; 532 participants (89%). Around half of the participants; 312 participants (52%) were from Urban Governorates (mainly Cairo and Alexandria), and 115 participants (19%) were from Lower Egypt Governorates, 170 participants (28%) were from Upper Egypt Governorates, while representation from frontier governorates were very small, only 4 participants (0.7%). Appendix (X) illustrates the participation from the different individual Egyptian governorates.

The mainstream participants were educated (University and Post-Graduate Degrees), only 21 participants (3.5%) represented lower educational levels (completed only primary education, or secondary education 'Diplome'). The participants were classified as 'Individuals with No Medical Backgrounds' 390 (65%), and 'Individuals with Medical Backgrounds,' 211 (35%) (mainly pharmacists and physicians).

With regards to the health profile of the participants and their utilization of medicines, the majority of the participants has some sort of medical insurance, only 161 participants (26.9%) reported having 'no health insurance coverage,' compared to 136 participants (22.7%) had 'complete coverage,' 164 participants (27.4%) had 'partial insurance coverage,' and 137 participants (23%) had 'non-utilized insurance coverage.'

Additionally, most of the participants reported covering the cost of their medicine out-of-pocket, 356 participants (59.5%); while 108 participants (18%) cover their medicines cost via insurance, and 134 participants (22.4%) cover their medicines cost both out-of-pocket and via insurance.

The majority of the participants reported being non-regular users of medications; only 125 participants (21%) used regular medications for chronic diseases, while 473 participants

(79%) do not use medications regularly. The average out-of-pocket spending on medicines was reported to be 475 EGP (SD 797; range 0–13,000; median 300).

With regards to visiting a pharmacy on a regular basis; 118 participants (20%) reported having frequent visits to the pharmacy (once a week), while 204 participants (34%) visit a pharmacy once a month, and 220 participants (37%) are non-regular visitors, (only when needed).

Overall, the participants represented various age groups, educational, economic, geographic, and health groups which can help claiming a good level of representation of the Egyptian Population, and support the generalizability of the study's results over Egypt, with some limitations regarding the educational level and type of place of residence, as highlighted earlier.

The detailed socio-demographic and economic characteristics as well as the health profile of the sample is presented in table (5).

Table (4): Background Characteristics of the Study Sample, Egypt, 2019

Variable	Total n=601		Individuals with No medical Background n= 390		Individuals with Medical Background n=211	
Age (years)						
<=29	206	(34.28)	151	(38.72)	55	(26.07)
30-39	284	(47.25)	158	(40.51)	126	(59.72)
40-49	75	(12.48)	51	(13.08)	24	(11.37)
50-59	20	(3.33)	17	(4.36)	3	(1.42)
>=60	16	(2.66)	13	(3.33)	3	(1.42)
Sex						
Female	378	(62.90)	231	(59.23)	147	(69.67)
Male	223	(37.10)	159	(40.77)	64	(30.33)
Type of place of residence						
Rural	69	(11.48)	52	(13.33)	17	(8.06)
Urban	532	(88.52)	338	(86.67)	194	(91.94)
Region						
Urban governorates[1]	312	(51.91)	201	(51.54)	111	(52.61)
Lower Egypt	115	(19.13)	73	(18.72)	42	(19.91)
Upper Egypt	170	(28.29)	114	(29.23)	56	(26.54)
Frontier Governorates	4	(0.67)	2	(0.51)	2	(0.95)
Income Level						
Very Poor	33	(5.49)	28	(7.18)	5	(2.37)
Poor	120	(19.97)	59	(15.13)	61	(28.91)
Middle	207	(34.44)	129	(33.08)	78	(36.97)
Rich	52	(8.65)	37	(9.49)	15	(7.11)
Very Rich	37	(6.16)	22	(5.64)	15	(7.11)
Do Not Like to Share	152	(25.29)	115	(29.49)	37	(17.54)
Educational Level						
No education	-	-	-	-	-	-
Primary complete/ some secondary	6	(1.00)	6	(1.54)	-	-
Secondary complete/ Diplome	15	(2.50)	15	(3.85)	-	-
University Degree	335	(55.74)	234	(60.00)	101	(47.87)
Post-graduate Degree	245	(40.77)	135	(34.62)	110	(52.13)
Marital status						
Not Married	239	(39.77)	160	(41.03)	79	(37.44)
Married	362	(60.23)	230	(58.97)	132	(62.56)
Work status						
Not Working	117	(19.47)	108	(27.69)	9	(4.27)
Working for Cash	484	(80.53)	282	(72.31)	202	(95.73)

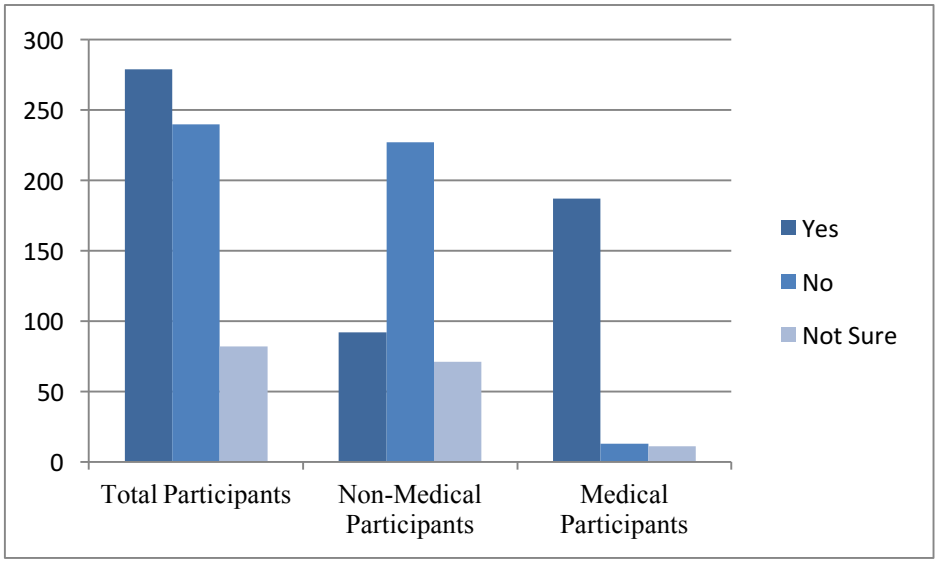
[1] Cairo, Alex, PortSaid, and Suez

Variable	Total n=601		Individuals with No medical Background n= 390		Individuals with Medical Background n=211	
Health Profile and Spendiing on Medicines						
Coverage by Insurance						
Complete Coverage	136	(22.74)	87	(22.42)	49	(23.33)
Partial Coverage	164	(27.42)	98	(25.26)	66	(31.43)
Unutilized Coverage	137	(22.91)	73	(18.81)	64	(30.48)
No Coverage	161	(26.92)	130	(33.51)	31	(14.76)
Coverage of Medicines' Cost						
Insurance	108	(18.06)	74	(19.07)	34	(16.19)
Out-of-Pocket	356	(59.53)	219	(56.44)	137	(65.24)
Both	134	(22.41)	95	(24.48)	39	(18.57)
Out-of-Pocket Expenditure on Medicines (Monthly Average)	475		513		404	
Visits to a Pharmacy						
Once a Week	118	(19.73)	80	(20.62)	38	(18.10)
Once a Month	204	(34.11)	125	(32.22)	79	(37.62)
Once every 3 Months	51	(8.53)	32	(8.25)	19	(9.05)
Once every 6 Months	5	(0.84)	5	(1.29)	-	-
Not Regular (when needed)	220	(36.79)	146	(37.63)	74	(35.24)
Regular Use of Medicines for Chronic Diseases						
Yes	125	(20.90)	84	(21.65)	41	(19.52)
No	473	(79.10)	304	(78.35)	169	(80.48)

5.2. Knowledge Regarding Generic Medicines:

Results showed that only 279 (46.4%) of the participants had heard of the term 'generic medicine.' Among the non-medical participants (lay public), only 92 (24%) reported their familiarity with the term 'generic medicines' or 'ganese,' compared to 227 (58%) who said they never heard the term and 71 (18%) who were not sure. Among the medical participants, 187 (89%) were familiar with the term, while 13 (6.2%) reported they do not know the term, and 11 (5.2%) were not sure about it,[18] as illustrated in figure (7).

Figure (7): Participants' Knowledge and Familiarity with the term 'Generic Medicine,' Study Sample, Egypt, 2019



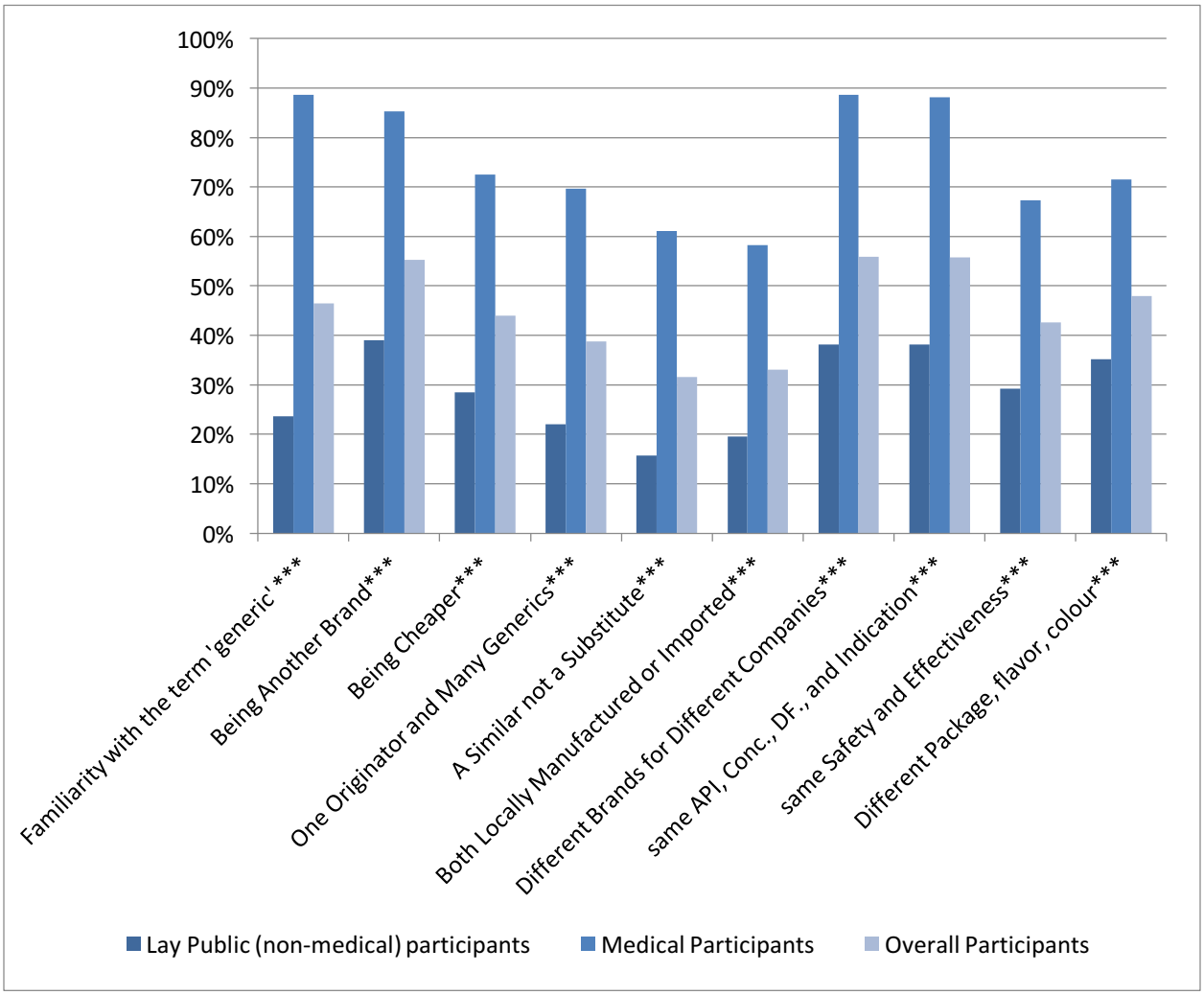
Despite non-familiarity with term 'generic,' participants showed varied knowledge levels regarding the concept of generic medicines, and its main characteristics, as illustrated in figure (8). While only 24% of the lay public reported their familiarity with the term 'generic,' 39% identified that generic medicine is another brand for a different pharmaceutical company, and 38% identified that it has the same active pharmaceutical ingredient (APIs), concentration (conc.), dosage form, and indication; and that they differ in package, flavors and color.

Two main characteristics were highly mis-conceptualized, among both lay public and medical professionals. The first, pertain to the fact that generic medicine is not the locally manufactured product per se; while the majority of locally manufactured pharmaceutical

[18] Only (1) pharmacist reported not knowing the term, and (5) pharmacists were not sure.

products are generics, there are imported generic pharmaceutical products, and, in contrary, some multinational pharmaceutical products manufacture their originator (branded) pharmaceuticals locally in the Egyptian factories. Only 19.5% of the lay public and 58.3% of medical professionals seemed quite familiar with this fact. The second mis-conceptualized point is the confusion between classifying the generic as a *similar* (completely identical pharmaceutical product), or *substitute* (another 'different' pharmaceutical that can be used therapeutically for the same disease). Only 15.6% of the lay public and 61% of medical professionals seemed quite familiar with this fact. Appendix (XI) illustrates the percentage of Prevalence of these two mis-conceptualized characteristics among physicians, and pharmacists.

Figure (8): Knowledge Level of Participants regarding the 'Main Characteristics' of Generic Medicines,' Study Sample, Egypt, 2019

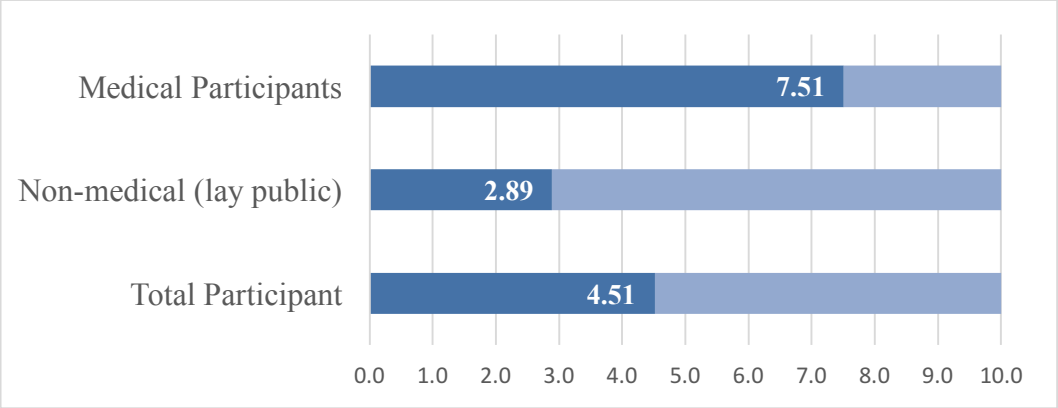


*** P- value < 0.001

Moreover, only 28% of the lay public participants and 72.5% of the medical professionals reported knowing that generics are cheaper than the originator (branded) pharmaceuticals. Finally, only 29% of the lay public participants and 67% of the medical professionals reported knowing that the generic is equally effective and safe as the originator (branded) pharmaceutical.

The overall correct knowledge of the concept of generic medicines was assessed on a scale from 1 to 10, as illustrated in figure (9), the overall mean of the sample estimated at 4.51 (95% CI: 4.22, 4.8), with the lay public knowledge mean estimated at 2.89 (2.58, 3.2); compared to medical professional's knowledge mean of 7.5 (95% CI: 7.21, 7.82).

Figure (9): The Overall Knowledge Level of Participants regarding the concept of Generic Medicines, Study Sample, Egypt, 2019



*** P- value < 0.001

The association between the overall level of knowledge of generic medicines and the different socio-demographic, economic and health related factors were assessed using a regression analysis, table (6). The results indicate minor association of knowledge with sex, males seem to have better knowledge of generic (p-value <0.05); income level, where only very-rich participants were associated with a higher level of generics' knowledge (p-value <0.05). No associations were found between the level of knowledge regarding the concept of generic medicine with age, educational level, marital or work status, insurance coverage, out-of-pocket expenditure, regular use of medicines, or regular visits to the pharmacy. As expected a significant association between the level of knowledge and the professional background; being a medical professional or lay public (P-value <0.001).

Table (5): The Association between the Level of Knowledge of Generic Medicine and the Different Socio-demographic, Economic, and Health related Factors, Study Sample, Egypt, 2019

Variable	Knowledge Regarding the Concept of Generic Medicines		
	Coefficient	95% CI	P-Value
Age (years)	-0.017	-0.0495 - 0.01622	0.320
Sex*			
Male	0.615	0.05165 - 1.17913	0.032
Type of place of residence			
Urban	-0.047	-0.921 - 0.82771	0.917
Region			
Lower Egypt	0.199	-0.5213 - 0.91911	0.588
Upper Egypt	0.003	-0.6347 - 0.64066	0.993
Frontier Governorates	-3.812	-6.6706 - -0.9532	0.009
Income Level			
Poor	-0.357	-1.1412 - 0.42625	0.371
Middle	0.353	-0.33 - 1.03663	0.310
Rich	-0.036	-1.0116 - 0.93873	0.941
Very Rich*	1.441	0.25865 - 2.62243	0.017
Educational Level			
Secondary complete/ Diplome	1.229	-1.8711 - 4.33002	0.436
University Degree	0.678	-1.8635 - 3.21877	0.601
Post-graduate Degree	0.876	-1.6964 - 3.44736	0.504
Marital status			
Married	0.166	-0.3796 - 0.71071	0.551
Work status			
Working for Cash	-0.460	-1.2399 - 0.32029	0.247
Health Profile and Spendiing on Medicines			
Coverage by Insurance			
Partial Coverage	-0.462	-1.219 - 0.296	0.232
Unutilized Coverage	-0.162	-1.024 - 0.700	0.712
No Coverage	-0.244	-1.186 - 0.698	0.611
Coverage of Medicines' Cost			
Out-of-Pocket	0.281	-0.542 - 1.105	0.502
Both	0.338	-0.453 - 1.130	0.402
OOP Expenditure on Medicines*	0.00031	-0.00001 - 0.00063	0.058
Visits to a Pharmacy			
Once a Week	-0.502	-1.191 - 0.186	0.152
Once a Month	-0.363	-0.959 - 0.232	0.231
Once every 3 Months	-0.467	-1.399 - 0.466	0.326
Once every 6 Months	-0.899	-3.716 - 1.919	0.531
Regular Use of Medicines for Chronic Diseases			
Yes	0.277	-0.376 - 0.930	0.405
Professional Background (Medical)* **			
Pharmacist	5.394	4.738 - 6.051	0.000
Physician	3.198	2.104 - 4.293	0.000

CI Confidence Interval

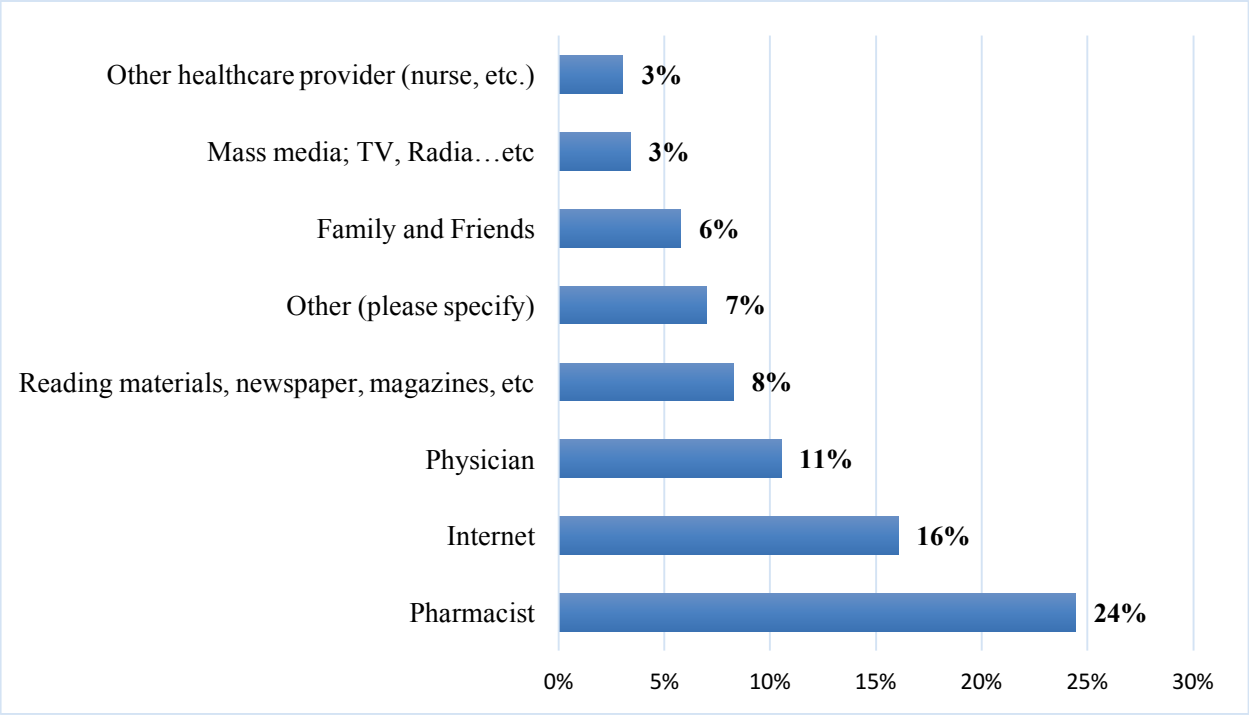
*** $p < 0.001$

** $p < 0.01$

* $p < 0.05$

The common information sources regarding generic medicines are illustrated in figure (11). Generally, the participants, especially the non-medical participants, were informed by pharmacists (24%), followed by the internet (16%), then by physicians (11%), followed by reading materials and mass media. The medical field participants reported that their source of information was, expectedly, study and professional experience.

Figure (10): Participants' Source of Information regarding Generic Medicines, Study Sample, Egypt, 2019

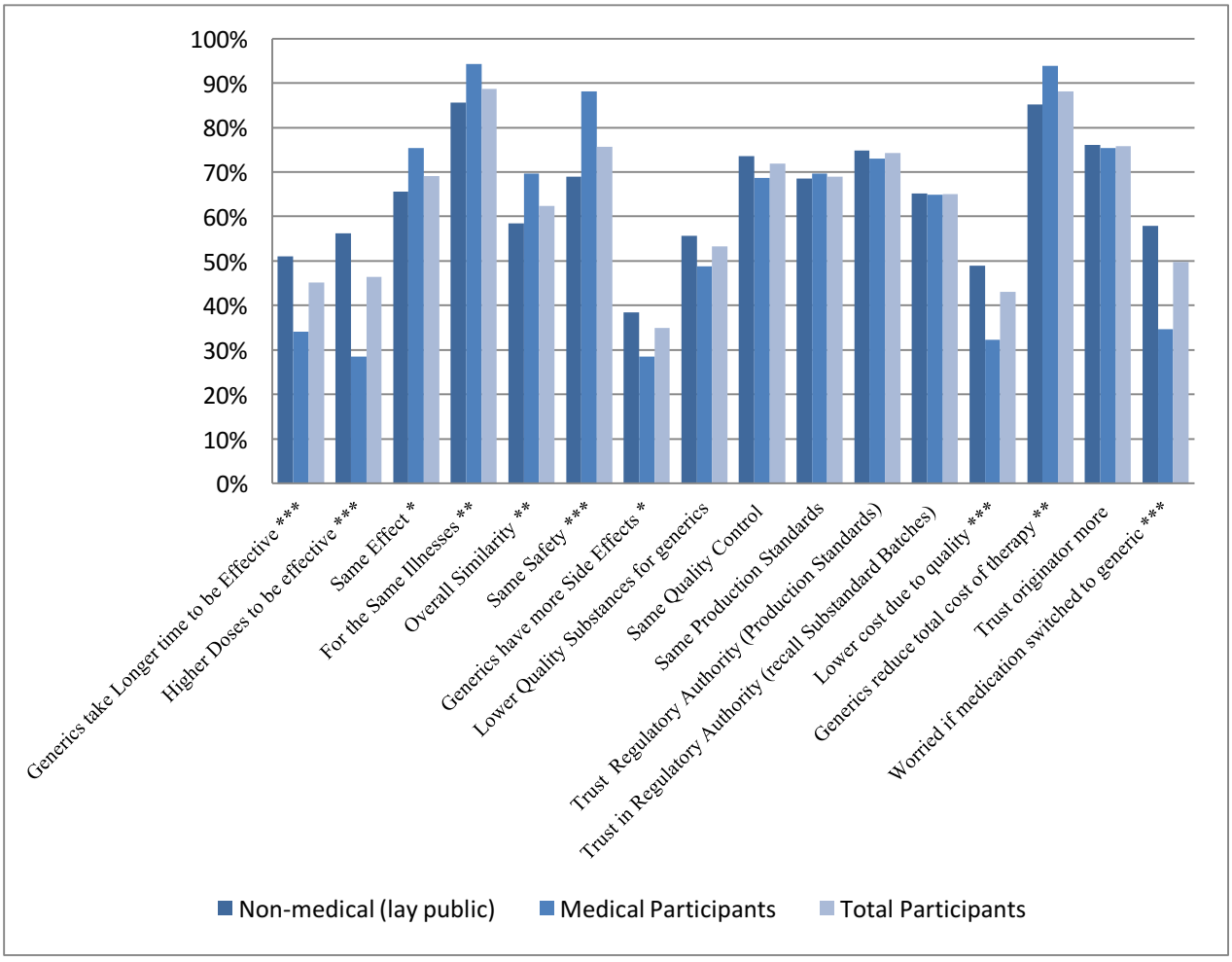


After understanding what is a generic medicine, the vast majority of participants (96% of the overall participants; 95% of the mon-medical (lay public) participants and 98% of the medical-professionals) agreed that the public Egyptian users need to get more awareness and information about generic medicines.

5.3. Perceptions of Generic Medicines:

Results showed varied levels of Egyptians' perceptions towards generic medicines. After explaining the concept of generic medicines, participants' perceptions were assessed based on their opinions[19] regarding number of statements. Figure (11) illustrates participants' opinions regarding generic medicines (the percentage of participants who agreed (strongly agree, agree, somewhat agree) to each statement.

Figure (11): Participants' Personal Opinions regarding Generic Medicines, Study Sample, Egypt, 2019

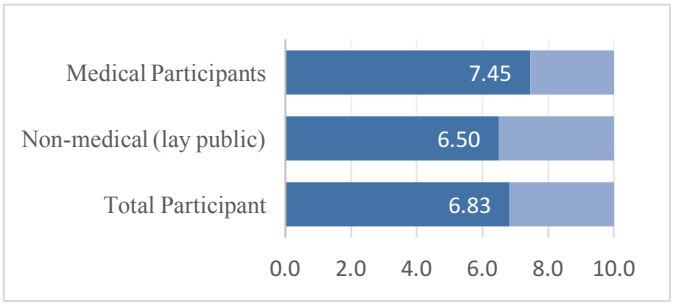


*** P- value < 0.001
** P - value < 0.01
* P- value < 0.05

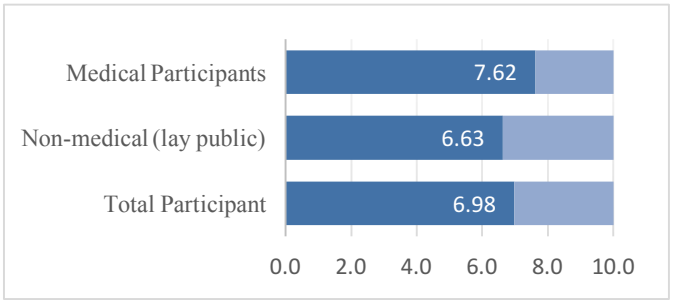
[19] Participants were instructed to reflect on their personal opinions and beliefs, which differ from person to another, with no right not wrong answers

The overall perceptions of participants towards generic medicines' effectiveness, safety, quality, and cost dimensions, as well as the overall perception[20] were assessed on a scale from 1 to 10, with higher scores indicating better perceptions, as illustrated in figure (12).

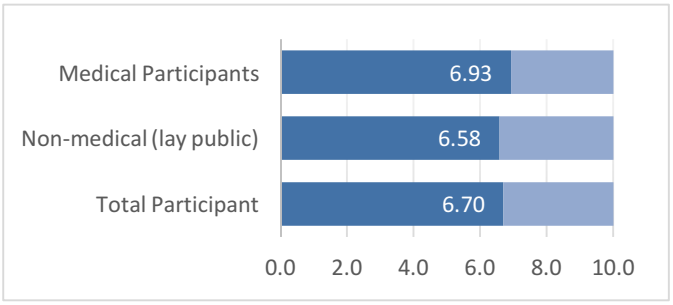
Figure (12): Participants' Perceptions towards Generic Medicines, Study Sample, Egypt, 2019



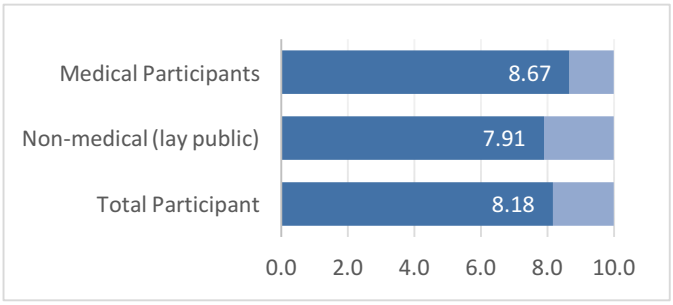
(a) Perceptions of Effectiveness***



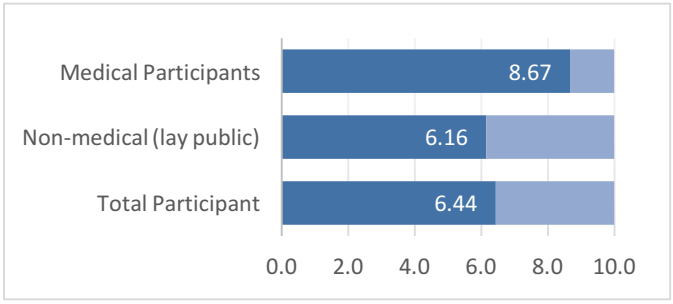
(b) Perceptions of Safety***



(c) Perceptions of Quality*



(d) Perceptions of Cost & Financial Impact***



(e) Overall Perceptions towards Generic Medicines***

*** P- value < 0.001
** P - value < 0.01
* P- value < 0.05

[20] As explained earlier, in the research design chapter, the different statements were classified into the four main dimensions of the generic medicine; effectiveness, safety, quality, and cost, to have an aggregate measures of perceptions, with higher score indicating better perceptions

Perception of Effectiveness:

Participants' opinions and views towards generic effectiveness and its equivalency with the originator brand, *"perception of effectiveness,"* scored, on average, 6.5 for the lay public participants; while for medical professionals, perception of effectiveness, scored, on average, 7.45 (the difference between the two groups was statistically significant at P-value < 0.001).

A vast majority of participants believed that generics are used for the same illnesses (88% of lay public & 94% of medical professionals), and have the same effect (66% of lay public & 75% of medical professionals). However, more than 50% of the lay public believed that generics take a longer time or need higher doses to be equally effective to the originator brand; compared to around 30% of the medical professionals who had the same opinion.

Perception of Safety:

Participants' opinions and views towards generic safety and its comparability to the originator brand, *"perception of safety,"* scored, on average, 6.6 for the lay public participants; while for medical professional, it scored, on average, 7.6 (the difference between the two groups was statistically significant at P-value < 0.001).

The majority of participants believed that generics have the same safety as originator (branded) medicines; 70% of lay public and 88% of medical professional agreed that overall both generic and originator have the same safety, compared to around 30% of the lay public and around 20% of the medical professionals who believe that generics tend to have more side effects.

Perception of Quality:

Regarding the quality of generic medicines, *"perception of quality,"* lay public participants scored, on average, 6.6; while for medical professional, it scored, on average, 6.9 (the difference between the two groups showed minor statistical significance, P-value < 0.05).

Around 50% of the lay public participants, as well as medical professionals believed that generics are manufactured using lower quality substances. 49% of the lay public doubt that generics' low cost is due to lower quality; compared to 30% of medical professionals.

With regards to the production standards and quality control, around 70%, of both the lay public and the medical professional, believe that both generics and originator (branded) medicines follow the same standards.

As a requirement of ensuring the quality of any marketed medicinal product, health authorities should be able to detect any possible irregularities in its production, and, in time, recall any distributed batches with reduced effectiveness and/or safety. In this regard, around 70%, of both the lay public and the medical professionals, believe that the Egyptian health authority is capable of detecting possible irregularities in the production of generic medicines; and 65%, of both the lay public and the medical professionals, agree that the health authority would be able to detect, in time, and recall batches of generic medicines with reduced effectiveness and/or safety.

Perception of Cost and Financial Impact:

Participants' opinions and views of the cost and financial impact of generic medicine towards the total cost of therapy reflect an average score of 7.9 for the lay public and 8.7 for the medical professionals (the difference between the two groups was statistically significant at P-value < 0.001). The vast majority of the medical professional (94%) believe that the use of generic medicines contributes to reducing the total cost of therapy, compared to 85% of the lay public who agree to this cost-related characteristic of generic medicines.

Overall Perception:

In general, 75% of the lay public participants as well as the medical professional, agreed that they would trust the originator (branded medicine) more than the generics. Around 60% of the lay public participants indicated that they would be worried if their medication was switched into a generic medicine, compared to 35% of the medical professionals.

The different dimensions of perception (effectiveness, safety, quality, cost, and overall trust as well) were aggregated to reflect an overall perception towards generic medicine. The overall perception of lay public participant scored 6, compared to 8.7 for the medical professionals (the difference between the two groups was statistically significant at P-value < 0.001).

The association between the overall perceptions towards generic medicines and the different socio-demographic, economic and health related factors, as well as, the level of knowledge as estimated from the sample were assessed using a regression analysis, table (7). The results indicate no associations between the perception towards generic medicine with age, sex, educational level, income level, marital or work status, insurance coverage, out-of-pocket expenditure, regular use of medicines, or regular visits to the pharmacy. However, moderate association was found among medicine users who cover their medication costs out-of-pocket, they tend to have slightly better perceptions towards generic medicines (P-value = 0.006). Besides, pharmacists tend to have a moderately significant association to good perceptions of generic medicines (P-value = 0.002); contrary to physicians whose perceptions showed no statistical difference from the lay public.

The prior correct knowledge of the concept of generic medicine, also, showed a moderately significant association, where participants with correct knowledge had slightly better perceptions towards generic medicine (P-value = 0.04).

Table (6): The Association between the Perceptions towards Generic Medicine and the Different Socio-demographic, Economic, Health related Factors, and the Knowledge of Generics, Study Sample, Egypt, 2019

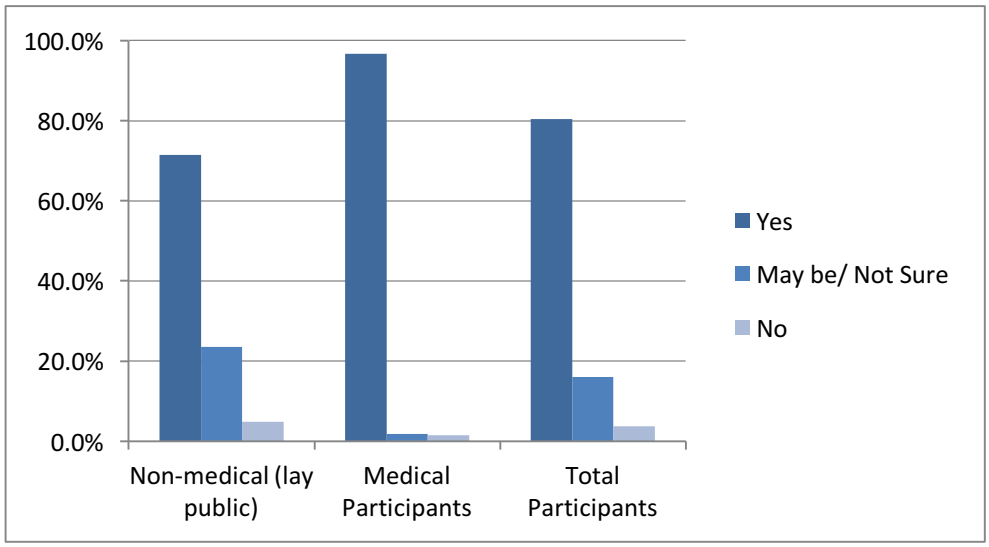
Variable	Overall Perceptions towards Generic Medicines		
	Coefficient	95% CI	P-Value
Age (years)	0.009	-0.0073 - 0.02427	0.289
Sex			
Male	0.147	-0.1241 - 0.41844	0.287
Type of place of residence			
Urban	0.048	-0.3708 - 0.46686	0.822
Region			
Lower Egypt	-0.019	-0.3637 - 0.32647	0.916
Upper Egypt	-0.031	-0.3361 - 0.27479	0.844
Frontier Governorates	-0.101	-1.4798 - 1.27764	0.886
Income Level			
Poor	-0.035	-0.4111 - 0.3403	0.853
Middle	-0.307	-0.6343 - 0.02093	0.066
Rich	-0.160	-0.6273 - 0.30684	0.501
Very Rich	-0.432	-1.0009 - 0.13787	0.137
Educational Level			
Secondary complete/ Diplome	1.478	-0.0078 - 2.96425	0.051
University Degree	0.419	-0.7987 - 1.63626	0.499
Post-graduate Degree	0.521	-0.7112 - 1.75369	0.406
Marital status			
Married	-0.082	-0.3436 - 0.17884	0.536
Work status			
Working for Cash	0.096	-0.2781 - 0.47025	0.614
Health Profile and Spendiing on Medicines			
Coverage by Insurance			
Partial Coverage	-0.114	-0.477 - 0.249	0.537
Unutilized Coverage	-0.399	-0.812 - 0.014	0.058
No Coverage	-0.188	-0.639 - 0.263	0.413
Coverage of Medicines' Cost			
Out-of-Pocket**	0.559	0.164 - 0.954	0.006
Both	0.365	-0.015 - 0.744	0.060
OOP Expenditure on Medicines	-0.00004	-0.00019 - 0.00011	0.604
Visits to a Pharmacy			
Once a Week	-0.071	-0.402 - 0.260	0.674
Once a Month	-0.084	-0.370 - 0.202	0.563
Once every 3 Months	-0.096	-0.543 - 0.351	0.672
Once every 6 Months	0.828	-0.522 - 2.178	0.229
Regular Use of Medicines for Chronic			
Yes	-0.073	-0.386 - 0.239	0.645
Professional Background (Medical)* **			
Pharmacist**	0.630	0.241 - 1.019	0.002
Physician	0.206	-0.335 - 0.748	0.455
Level of Knowledge towards the concept of Generics*	0.044	0.00204 - 0.08672	0.040

CI Confidence Interval
*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$

5.4. Attitudes towards Generic Medicines:

After understanding what is a generic medicine, the vast majority of participants reported their prior use of a generic medicine, 483 (80%) of the overall participants indicated that they have used a generic medicine before [279 (71.5%) of the lay public participants and 204 (97%) of the medical professionals]; 96 (16%) of the overall participants indicated that they are still not sure if they have used a generic medicine before [92 (23.6%) lay public participants and 4 (2%) of the medical professionals]; compared to 22 (3.7%) of the overall participants who indicated that they have never used a generic medicine before [19 (4.9%) the lay public participants and 3 (1.5%) of the medical professionals], as illustrated in figure (13).

Figure (13): Participants' Prior Use of Generic Medicines, Study Sample, Egypt, 2019



Nevertheless, participants showed varied attitudes towards their acceptability and readiness to use (switch to) a generic medicine, if given the choice, depending on different assessed factors; *price* difference between the originator (brand) and the generic medicine, *the medical condition* itself {minor (mild), severe, or chronic condition}, the *manufacturing status* of the medicine (locally manufactured versus being imported), the *medical professional* who advise about the generic (the pharmacist versus the physician), and finally if any *side effects* appeared from using the medication. Figure (14) illustrates participants' attitudes towards using generic medicines (the percentage of participants who agreed (strongly agree, agree, somewhat agree) to

use the generic or the originator medicine given the different factors. Additionally, these attitudes were assessed on a scale from 1 to 10 to reflect the impact of each factor on the decision to buy (switch to) a generic medicine, if participants were given the choice, as well as the overall attitude to use generic medicine, with higher scores indicating using a generic medicine, as illustrated in figure (15).

Figure (14): Participants' Opinions towards Using (Switching) to a Generic Medicines, Study Sample, Egypt, 2019

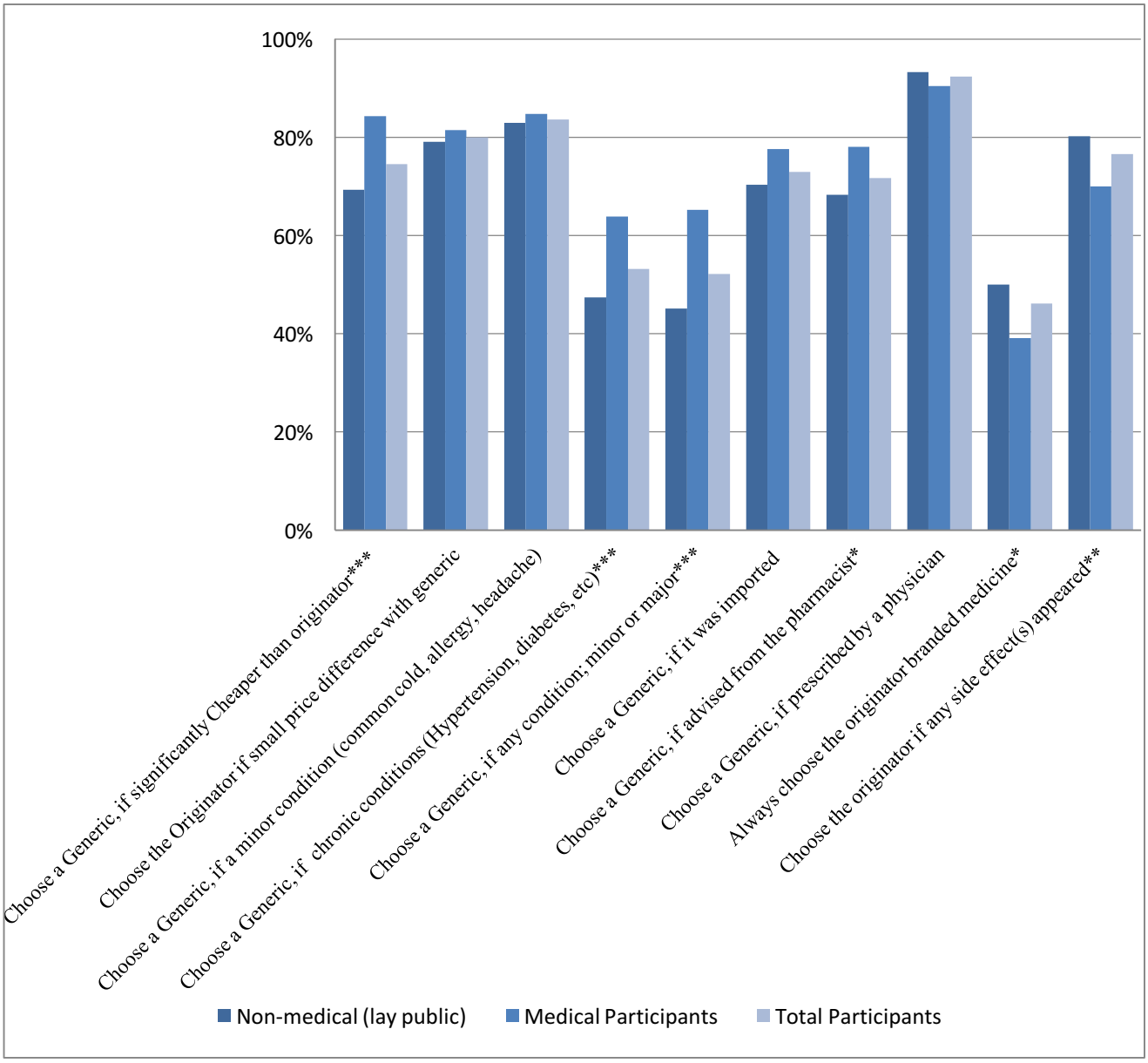
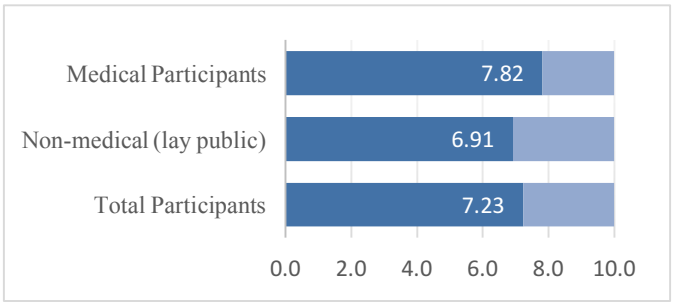
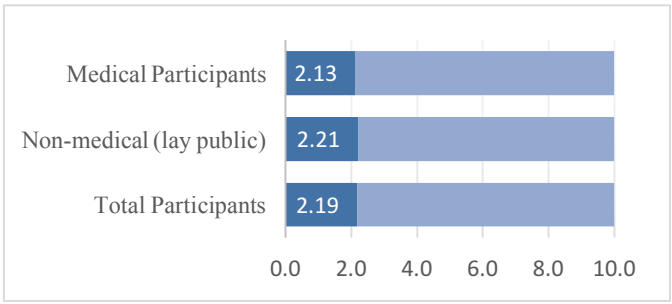


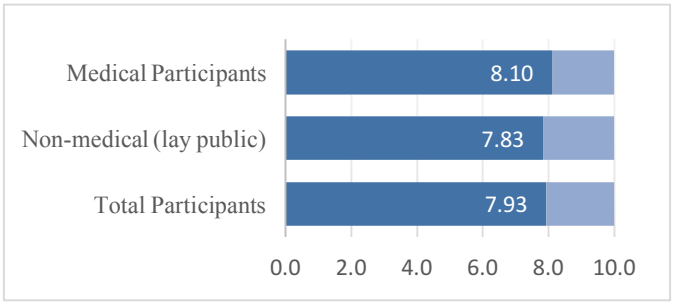
Figure (15): Participants' Attitudes towards Generic Medicines, Study Sample, Egypt, 2019



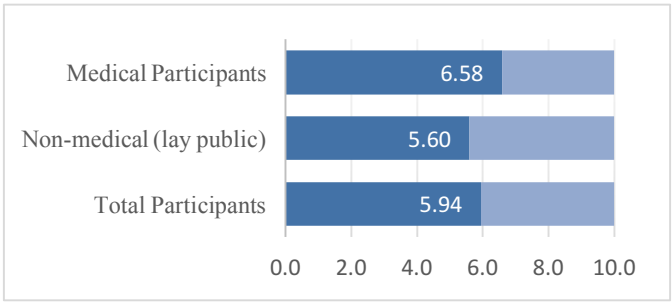
(a) Attitude towards choosing a generic, if **significantly Cheaper** than originator***



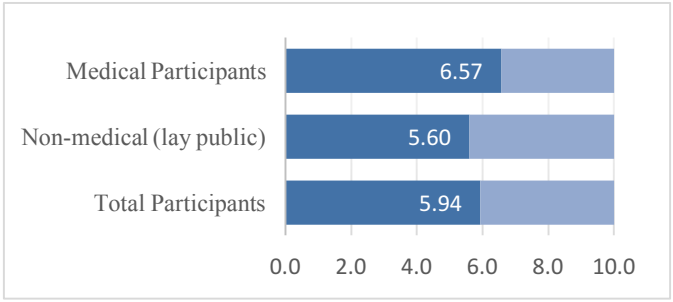
(b) Attitude towards choosing a generic, if it has **a small price difference** with the originator



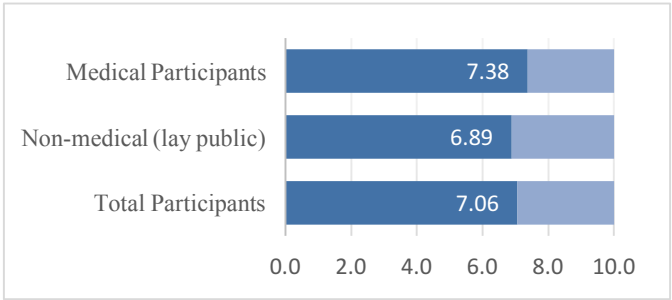
(c) Attitude towards choosing a generic, if the **medical condition** was **minor** (headache, cold, etc.)



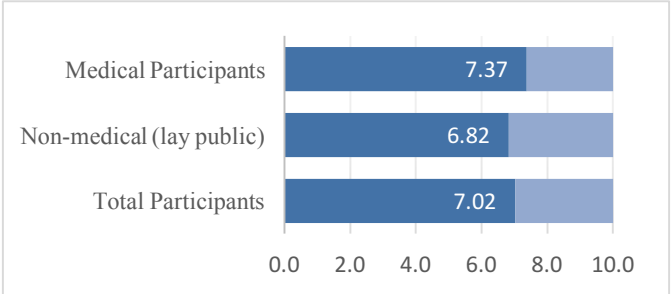
(d) Attitude towards choosing a generic, if the **medical condition** was **Chronic** (hypertension, etc.) ***



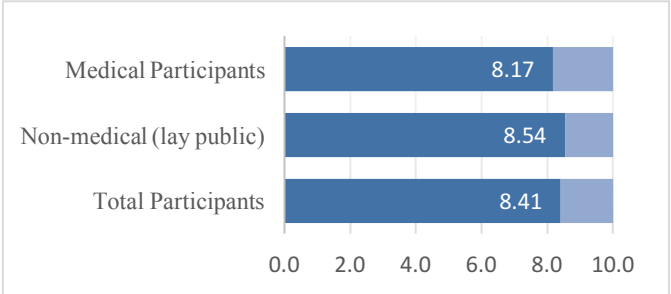
(e) Attitude towards choosing a generic, for **any medical condition**, minor or major ***



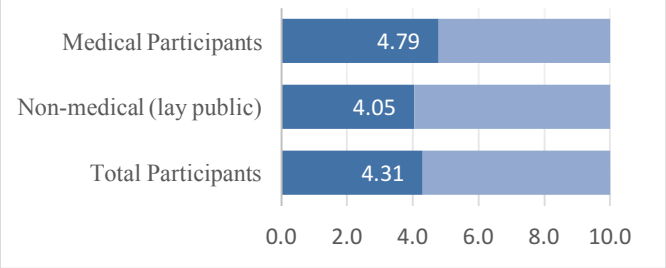
(f) Attitude towards choosing a generic, if it was **imported***



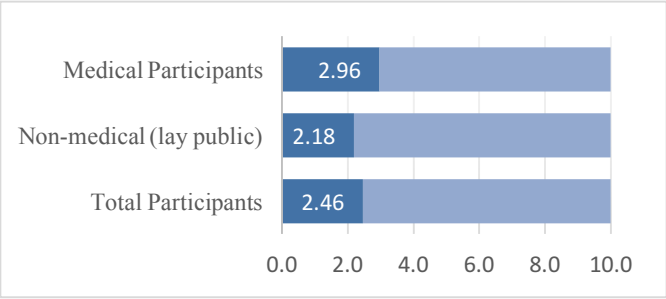
(g) Attitude towards choosing a generic, if **advised** by the **Pharmacist** **



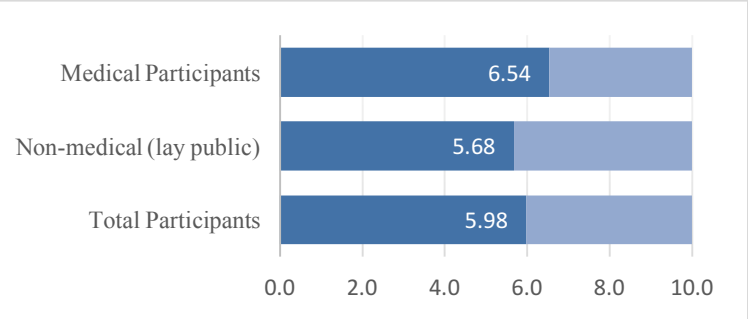
(h) Attitude towards choosing a generic, if **prescribed** by the **Physician** *



(i) Attitude towards using a generic ***



(j) Attitude towards using a generic, even side effects ***



(k) Overall Attitude towards using a Generic Medicine ***

*** P- value < 0.001
** P - value < 0.01
* P- value < 0.05

Financial Cost as an Attitude Determinant,

Participants' attitudes towards using (switching to) a generic medicine, if it was significantly cheaper than its originator (branded) medicine scored, on average, 6.91 for the lay public participants; while for medical professionals, it scored, on average, 7.82 (the difference between the two groups was statistically significant at P-value < 0.001).

The majority of participants agreed to use (switch to) a generic medicine that is significantly cheaper than the originator (branded) medicine (69% of lay public participants & 84% of medical professionals). In contrary, only 20% of both the lay public participants, as well as the medical professionals, reported that they will use generic medicine, even if the price difference with the originator was small.

Medical Condition as an Attitude Determinant,

Participants' reflected different attitudes towards using (switching to) a generic medicine, according to the medical condition. On average, for minor medical conditions, lay public participants scored 7.8 and medical professional scored 8.2 (with no statistical difference among the two groups); compared to the attitudes towards generics' use for any medical condition—even if it is a chronic condition which entails a life-time treatment—where lay public participants scored 5.6 and medical professional scored 6.57 (the difference between the two groups was statistically significant at P-value < 0.001).

In other words, the vast majority of participants (80%), whether they are lay public or medical professionals, would agree to use (switch to) a generic medicine if they have a minor medical condition; other wise, only 45% of the lay public and 65% of the medical professionals may agree to use (switch to) a generic medicine.

Manufacturing Status as an Attitude Determinant,

With regards to the manufacturing status—one of the most mis-conceptualized characteristics of a generic versus a brand medicine—lay public participants' attitude scored, on average, a 6.9 if the generic is imported, and medical professionals' scored an average of 7.4 (the difference between the two groups showed slight statistical difference at P-value < 0.05).

In essence, 70% of the lay public participants would agree to use (switch to) a generic medicine if it was an imported medicine (not locally manufactured); comparted to 78% of the medical professionals.

Healthcare Provider as an Attitude Determinant,

Participants' reflected different attitudes towards using (switching to) a generic medicine, depending on whether they were advised from a physician or a pharmacist. On average, if advised from a physician, lay public participants' scored 8.5 towards using a generic medicine, and medical professionals scored an average of 8.17; contrary to a score of 6.8 of the lay public and a score of 7.4 for the medical professionals, if they were advised from a pharmacist (the difference between the two groups showed slight statistical difference at P-values < 0.01 and P-value < 0.05, respectively).

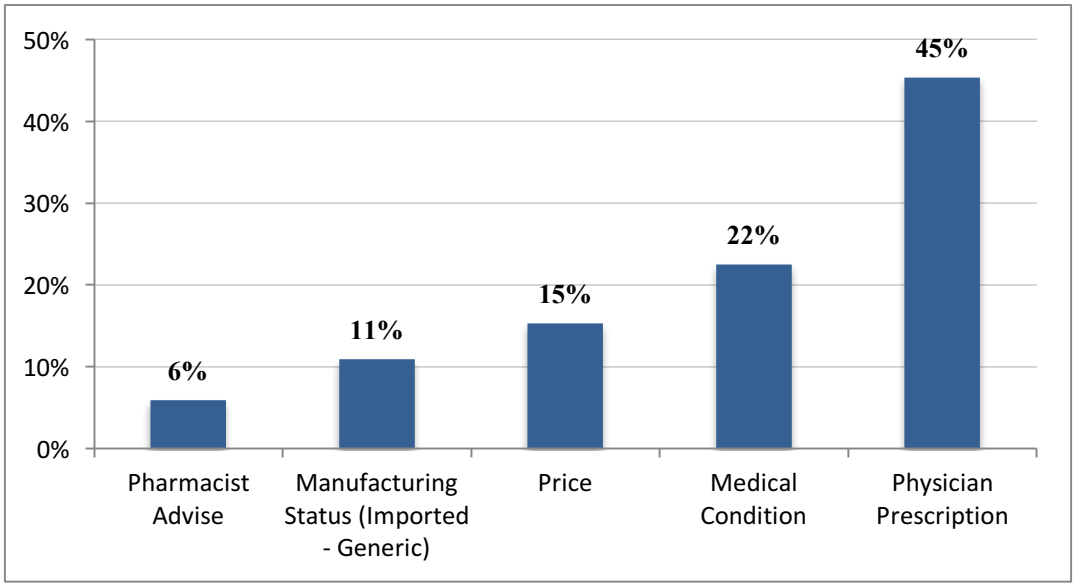
In other words, around 70% of participants would agree to use (switch to) a generic medicine if advised from a pharmacist, compared to 90% of participants who would agree to use (switch to) a generic medicine if advised from a physician.

Incurrence of Side Effects as an Attitude Determinant,

Participants reflected negative attitudes towards using a generic medicine, if side effects from using the medicine appeared, where 80% of the lay public and 70% of the medical professionals said they would choose the originator medicine in case of side effects. Represented on the attitudes scale, this dimension scored, on average 2.2 for the lay public and 2.9 for the medical professionals. (the difference between the two groups was statistically significant at P-value < 0.001).

Among the different determinants impacting the choice whether to use the generic or the originator medicine, 45% of the participants chose the 'Physician Prescription,' as the main influencing factor towards their decision to use (switch to) generic medicine, followed by 22% who choose the medical condition, followed by the price (15%) and the manufacturing status (11%), while the pharmacist advice appeared the lowest in the list (6%), as shown in figure (16).

Figure (16): Main Factor influencing the Participant Decision towards Using a Generic Medicine, Study Sample, Egypt, 2019



Overall Attitude:

Generally, 50% of the lay public participants and 39% of the medical professionals, reflected that they would choose the originator (branded medicine) not the generic medicine if they were given the choice. In Summary, the overall attitude of the participants towards using generic medicine, based on the different determinants, was estimated to score 5.7 and 6.5 for the lay public participants and medical professionals, respectively.

The association between the overall attitude towards using generic medicines and the different socio-demographic, economic and health related factors, as well as, the level of knowledge and perceptions of generics as estimated from the sample were assessed using a regression analysis, table (8). The results indicate no significant associations between the attitudes towards using a generic medicine with age, sex, income level, marital or work status. Only slightly significant negative association was found with higher educational levels (P-value < 0.05). Additionally, no significant associations were found with regards to insurance coverage, out-of-pocket expenditure, regular use of medicines, or regular visits to the pharmacy.

Pharmacists tend to have significantly better attitudes towards using generic medicines (P-value < 0.001); contrary to physicians whose overall-attitudes showed no statistical difference from the lay public. The prior correct knowledge of the concept of generic medicine showed no statistical association to the participants' overall attitude; however, participants' perceptions have a positive statistically significant association with the overall attitude towards using generic medicines (P-value < 0.001).

Table (7): The Association between the Attitudes towards using Generic Medicine and the Different Socio-demographic, Economic, Health related Factors, the level of Knowledge, and Perceptions towards Generics, Study Sample, Egypt, 2019

Variable	Overall Attitude towards Generic Medicines's Use		
	Coefficient	95% CI	P-Value
Age (years)	0.013	-0.00722 - 0.032258	0.213
Sex			
Male	0.307	-0.03233 - 0.64703	0.076
Type of place of residence			
Urban	-0.024	-0.54778 - 0.499894	0.928
Region			
Lower Egypt	0.177	-0.25482 - 0.608329	0.421
Upper Egypt	-0.208	-0.59007 - 0.174009	0.285
Frontier Governorates	0.146	-1.57865 - 1.870248	0.868
Income Level			
Poor	0.546	0.076535 - 1.016341	0.023
Middle	0.267	-0.14383 - 0.678532	0.202
Rich	0.258	-0.32671 - 0.842227	0.387
Very Rich	0.433	-0.28071 - 1.146742	0.234
Educational Level			
Secondary complete/ Diplome *	-2.423	-4.28843 - -0.55688	0.011
University Degree	-1.429	-2.95266 - 0.094204	0.066
Post-graduate Degree*	-1.564	-3.10683 - -0.02185	0.047
Marital status			
Married	0.238	-0.08885 - 0.564798	0.153
Work status			
Working for Cash	-0.442	-0.91048 - 0.025717	0.064
Health Profile and Spendiing on Medicines			
Coverage by Insurance			
Partial Coverage	0.042	-0.412 - 0.497	0.855
Unutilized Coverage	-0.226	-0.744 - 0.293	0.393
No Coverage	-0.209	-0.774 - 0.356	0.468
Coverage of Medicines' Cost			
Out-of-Pocket	0.390	-0.107 - 0.887	0.124
Both	0.289	-0.187 - 0.765	0.233
OOP Expenditure on Medicines	-0.00003	-0.00023 - 0.00016	0.739
Visits to a Pharmacy			
Once a Week	-0.085	-0.498 - 0.329	0.687
Once a Month	0.244	-0.113 - 0.602	0.180
Once every 3 Months	-0.478	-1.037 - 0.081	0.094
Once every 6 Months	0.091	-1.600 - 1.782	0.916
Regular Use of Medicines for Chronic Diseases			
Yes	0.051	-0.340 - 0.442	0.798
Professional Background (Medical)			
Pharmacist**	0.666	0.175 - 1.157	0.008
Physician	0.261	-0.417 - 0.938	0.450
Level of Knowledge of the concept of Generics	-0.030	-0.08273 - 0.023639	0.276
Level of Perceptions towards Generic Medicines* **	0.661	0.550453 - 0.771804	0.000

CI Confidence Interval
*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$

Chapter Six: Discussion

Medications represent a special kind of goods whereby three main players are controlling the demand side activities of the market; prescribing (physicians), dispensing (pharmacists), and purchasing[21] and use (patients or consumers, referred to as 'lay public,' in the context of pharmaceutical policies (Almarsdóttir & Traulsen, 2005d)).

Physicians and, in some cases pharmacists, have long been seen as the decision makers 'purchasing agents,' while the patients (lay public) were considered to be a silent user (Burstall, 1997), where they do not judge directly the suitability of their medicines. However, as highlighted in the literature "as individuals, the lay public accept personal responsibility for their health and undertake a range of self-directed and motivated health measures on their own" (Almarsdóttir & Traulsen, 2005d, P. 274); hence, a new view of healthcare started to emerge, in which patients were expected and encouraged to take a more active role in their healthcare and treatment decisions (Garfield et al., 2007), and, consequently patients' experiences and perspectives became, more than ever, a crucial sources of knowledge for decision and policy makers (Almarsdóttir & Traulsen, 2005d).

Generic medicine is a pharmaceutical product which is bioequivalent to the innovator (originator branded) product in terms of dosage form, strength, route of administration, quality, safety, performance characteristics, and intended use (WHO, 2004; US FDA, n. d.; and EMA, 2012). Hence, both have therapeutic and safety equivalence (Chow, 2014; US FDA, 2018). As illustrated earlier bio-equivalency is ensured via 'bio-equivalence' test, performed in accredited laboratories, regulated and audited from the health regulatory authority. Moreover, generic medicines offer a great opportunity for substantial financial savings, which help containing the escalating costs of healthcare in general, and medications, in particular (Shafie & Hassali, 2008; Cameron et al., 2009; Coombes, 2009; Cameron et al., 2012; Hassali et al., 2014; Rana & Roy, 2015; and Generic Pharmaceutical Association, 2017).

Such key features of generic medicines, comparable quality and lower cost, have significantly resulted in a cost-effective, improved access, and, hence, affordability, to medications—both for governments and individuals who have to pay for medicines out of their

[21] In some cases, purchasing is covered by health insurance (payers), either public or private

pockets; as well as achieving a comprehensive and sustainable healthcare system (Cameron et al., 2009; King & Kanavos, 2002; and Rana & Roy, 2015).

The present study intended to provide an assessment of the lay Egyptian public knowledge, perceptions and attitudes towards generic medicines, however, understanding that a cross-sectional sample of the general public would definitely include medical professionals (mainly pharmacists and physicians), the results of the study differentiated between the two sub-populations; the non-medical participants (lay public) and the medical-professional participants (mainly physicians and pharmacists). The results pertaining to the medical professionals helped to highlight their views and beliefs of these important cost-effective category of medicines.

Knowledge of the Term and Concept of Generic Medicines

The findings demonstrated that Egyptians have low knowledge levels of the term and concept of generic medicines. Only 24% of the lay-public reported their familiarity with the term 'generic medicines' or 'doaa ganese' (in Arabic language). The term itself is not widely used even among medical professionals, who usually use the terms 'similar' or 'matheel' (in Arabic language),' and 'substitute' or 'badeel (in Arabic language); 6% of the medical professional participants reported that they do not know the term 'generic medicine' at all.

This finding was in accordance to other countries' experiences, where the term 'generic medicine' was not commonly used, nor familiar to patients and medicine consumers, in countries such as: Malaysia, Iraq, Japan, Australia and Jamica (Hassali, Kong & Stewart (2005); Gossell-Williams & Harriott (2007); Al-Gedadi, Hassali & Shafie (2008); Babar et al. (2010); Kobayashi, Karigome, Sakurada, Satoh & Ueda (2011); Sharrad & Hassali (2011)).

Despite the extreme non-familiarity with term 'generic,' participants showed varied knowledge levels regarding the concept of generic medicine and its main characteristics. Nevertheless, only 30%-40% of the lay public participants were somehow knowledgeable about the main characteristic of a generic medicine; being another brand with the same active pharmaceutical ingredient (APIs), concentration (conc.), dosage form, and indication; while being different in the package, flavors and color; and, thereafter, being a therapeutically equivalent to the originator brand with a comparable safety.

In line with prior research done in other countries (Hoshi & Kimura, 2008; Thomas &

Vitry, 2009; Babar et al., 2010; Kobayashi et al., 2011; Sharrad & Hassali, 2011; Toverud et al., 2011; Lebanova et al., 2012), the study highlights a lack of knowledge in the understanding of the concept of generic medicines among high percentage of participants who lack adequate knowledge or sufficient correct information about generic medicines.

In contrary, and as should be expected, medical professionals exhibited significantly higher levels of knowledge about generic medicines, where 80% - 90% of medical professional participants were knowledgeable about generics' main characteristic. Nevertheless, these percentages were, definitely, below preliminary expectations at all. Medical professionals should at least know what is a generic medicine, and its main characteristics, as it is an important part of their educational and professional background, whether they tend to trust it or not it, which may vary depending on different factors as highlighted in a number of prior studies (Toverud, Hartmann & Håkonsen, 2015).

As explored during the early stages of this research, a number of healthcare professionals and medicine users, mistakenly, differentiate between the generic and the originator brand, based on their manufacturing status:

> *"the generic, or similar, is the locally manufactured copy of the originator imported medicine."* (an Internalist specialist, physician),

Physicians' educational and professional background develop a deep experience in pharmaceuticals and medications characteristics, however, it seems that this experience centralized around the pharmacological aspects of medications (their efficacy), which did not expose them to the pharmaceutical market and its dynamics and characteristics. The same theme, also, emerged from one of the pharmaceutical industry representatives, who reflected how their imported generic are, frequently, thought to be the originator.

> *"One of our antibiotic medicines, imported generic, while the innovator branded comparator is locally manufactured; it is interesting how frequent the sales and marketing team get a feedback from physicians who think that our product is the originator brand, not the generic comparator, just because it is completely imported"* (a representative from a multinational pharmaceutical company, specialized only in generics).

Such confusion of the imported generic product as the innovator brand, explains how

prevalent the confusion is that the imported pharmaceuticals are the innovator ones while locally manufactured one are the generic counterparts; however, such confusion might have a serious quality concerns, where the quality standards of manufacturing are much higher in the imported products than the locally manufactured products, and here trust in the regulatory authority and its enforced standards should be reviewed and validated.

The study has spotted a wide prevalence of this confusion among lay public as well as medical professionals, regarding this concept; where 23% of the lay public, 21% of the physicians, and 32% of the pharmacists, believe that a generic medicine is the locally manufactured comparator of the imported originator branded medicine.

Another, widely held, confusion is that generic is a '*substitute*,' or '*badeel*' (in Arabic language). While *similar* medicines constitute the group of medicines that are completely identical, with exactly the same API, concentration, dosage form, and indication (the originator and its generics); the *substitute* medicine is another, different medicine that can be used therapeutically for the same indication (medical condition), after the approval of the prescribing physician or a well-qualified pharmacist. Only 30% of the physician participants identified that the generic is a 'similar' and not 'substitute' pharmaceutical product.

Negative Perceptions and Perceptual Barriers

Despite knowledge of the comparable quality and therapeutic equivalency between the generic and the originator branded medicines, and the financial impact of generic medicines, yet perceptual barriers were highlighted in a number of studies conducted in different countries. A large body of literature has reported negative perceptions and misconceptions about generic medicines among medicine consumers and patients, the exact percentage of consumers with such misconceptions varied widely from one country to another (Sansgiry, Bhosle & Pope, 2005; Bertoldi, Barros & Hallal, 2005; Hoshi & Kimura, 2008; Shrank, Cox, Fischer, Mehta & Choudhry, 2009; Keenum, DeVoe, Chisolm & Wallace, 2012; Lebanova et al., 2012; Ibrahim, McKinnon & Ngo, 2012; Sewell, Andreae, Luke & Safford, 2012), the results of this study reveal a similar pattern in the Egyptian context, where negative perceptions and perceptual barriers are widely prevalent.

In Malysia, Al-Gedadi et al. (2008) found out that "many participants reported that generic medicines are of lower quality (38.9%), are less effective (34.8%), and produce more

side effects (31.2%).” In USA, Shrank et al. (2009) estimated that “30% of the participants agreed that original medicines are more effective than their equivalent generic versions, and less than 10% felt generic medicines to be less safe than the original brands.” In Spain, Sicras-Mainar & Navarro-Artieda (2012) found out that “66.8% of participants considered generic medicines to be of the same quality as brand medicines, while 42.3% agreed that generic medicines produce more side effects and only a few (36.1%) agreed that generic medicines take the same time to produce their therapeutic effects”. In Bulgaria, Lebanova et al. (2012) found out that “almost 94% of participants believed that generic medicines are inferior in terms of quality, safety, and efficacy compared with brand medicines.”

In accordance to prior studies, the current study revealed that in Egypt “66% of lay public participants believe that generic medicines have the same effect as originator branded medicines; however, more than 50% of the lay public believed that generics take a longer time or need higher doses to be equally effective to the originator brand. 30% of the lay public participants believe that generics tend to have more side effects than originator medicines. With regards to quality issues, 50% of the lay public participants believed that generics are manufactured using lower quality substances, and doubt that generics’ low cost is due to lower quality. 85% agree that the use of generic medicines contributes to reducing the total cost of therapy.”

Unfortunately, the perceptual barriers against generic medicines is also evident among healthcare professionals (physicians and pharmacists), despite their, supposed, knowledge of the comparable quality and therapeutic equivalency between the generic and the originator branded medicines, and awareness of the role of generic drugs in the improvement of global access to medicines; Toverud, Hartmann & Håkonsen (2015), in their systematic review of physicians’ and pharmacists’ perspectives on generic drug use, highlighted marked differences regarding how these health professionals view the quality of generic medicines depending on the maturity of their country's healthcare system.

The study results cast a prominent light on the overall perceptions of the Egyptian medical professionals regarding generic medicines. Their overall perception towards generic medicines—as well as perceptions of effectiveness, safety, quality and cost—were, somehow, higher than that of the lay public; *overall perceptions* 8.7 out of 10 (compared to 6.2 for the lay public); perception of *effectiveness* 7.5 out of 10 (compared to 6.5 for the lay public); perception

of *safety* 7.6 out of 10 (compared to 6.6 for the lay public); perception of *quality* 6.9 out of 10 (compared to 6.6 for the lay public); and perception of *cost* 8.7 out of 10 (compared to 7.9 for the lay public). Yet, given their educational and professional background, the assessed perceptions were lower than the (should be) expected levels, particularly, perception of quality as well as trust in regulatory and health authority, which denote the need for attention and state intervention.

Besides, it is noteworthy to reflect that, among medical professionals, pharmacists exhibited significantly better perceptions towards generic medicines, while physicians exhibited worse perception towards generic medicines, which was comparable to lay public perceptions.

Preferences and Attitudes

Many studies in the literature showed that medicine consumers, still, prefer original brand medicines rather than generic versions; and that generic substitution was not perceived as an equal alternative to branded drugs by a significant proportion of patients (Sansgiry, Bhosle & Pope, 2005; Bertoldi, Barros & Hallal, 2005; Hoshi & Kimura, 2008; Shrank et al., 2009; Keenum et al., 2012; Lebanova et al., 2012; Ibrahim, McKinnon & Ngo, 2012; Sewell et al., 2012). The current study findings highlighted the prevalence of the same pattern in Egypt, where 50% of the lay public participants reflected that they would choose the originator (branded medicine) not the generic medicine, if they were given the choice. Moreover, 75% reflected that they trust originator more and 58% reflected that they would be worried if their medication was changed from originator branded medicine to a generic medicine.

Different important factors were reported, and highlighted in the literature, to affect a patient's attitude (preference) and decision to use a generic or a brand medicine. These factors were assessed in the current study as attitude determinant factors.

A strong evidence in the literature emphasized that both physicians and pharmacists play an essential role in the promotion of generic medicines and patients' acceptance of their use and generic substitution. Sicras-Mainar & Navarro-Artieda (2012) found out that 81.8% of surveyed medicine consumers in Spain would take generic medicines if prescribed by their physicians. While in many countries, physicians have a relatively more influential role than pharmacists in convincing patients to use generic medicines (Quintal & Mendes, 2012); in some countries—such as New Zealand, Malaysia, Finland, Norway and Japan—the majority of medicine

consumers would accept generic medicines based on recommendations of a physician or a pharmacist (Babar et al., 2010; Al-Gedadi et al., 2008; Heikkilä et al., 2007; Kjoenniksen, Lindbaek & Granas, 2006; Kobayashi et al., 2011b).

In line with this evidence, the study findings confirm that, in Egypt, the healthcare providers are main attitude determinants, where 90% of the participants would agree to use (switch to a generic medicine if advised from a physician, compared to 70% who would agree to do so if advised from a pharmacist, even though pharmacists were reported as the main source of information regarding generic medicines (24%), compared to physicians (11%). Higher levels of trust towards pharmacists are detected among many consumers, particularly those with lower socio-economic conditions, but based on personal experience; a patient reflected that:

> *"If I trust the pharmacist, I trust his advice; otherwise, whatever the physician prescribe, I would buy"* (50-year-old, Non-Educated, Diabetic and Hypertensive Patient)

The trust in the healthcare professional and his/ her advice is a key to any initiative introduced in the healthcare or pharmaceutical sector. Being a simple, non-educated, and elderly patient, his quote reflected how some patients consider their medication decisions and pharmacist advice simply by reverting back into their trust level.

Additionally, a pharmacist working and managing his privately owned community pharmacy at a low-income neighborhood, commented

> *"After many years of working in this pharmacy, the neighbors tend to trust my opinion and clinical advice. They stop by for quick clinical advice and treatment recommendations for most of their minor and simple conditions; they, also, double check with me after physician's prescription."* (pharmacist, working at his privately owned community pharmacy for 18 years)

From a pharmacist perspective, Mr. Pharmacist's neighborhood consider the mutual trust developed with him as an alternative for the costly physician visits and prescriptions for simple condition; and as a check point, even after a physician prescription, emphasizing the trust as a determining factor.

Such trust dimensions have a positive and negative repercussions from a policy

perspective, the positive side is that despite the overall preference and higher trust in physicians' opinion even in a pure pharmaceutical issue, which physicians seemed to be less knowledgeable about as this study revealed; yet lay public, as reflected from the informants, trust and value the pharmacist advice. On the other hand, this trust is developed on individual basis and not on a professional basis, which could be a serious challenge facing the the overall credibility and trust in the educational and qualifying system in Egypt or the professional practice of the profession.

A number of prior studies (Ganther & Kreling, 2000; Gaither et al., 2001; Al-Gedadi et al., 2008; Figueiras et al., 2009; Hassali et al., 2009; Figueiras, Marcelino & Cortes, 2008; Denoth, Pinget & Wasserfallen, 2011; Al Ameri et al., 2011; Sewell et al., 2012; Keenum et al., 2012), provided evidence that consumers were more willing to use generic medicines for mild conditions (eg, headache, fever, allergies and cold) but were less likely to use them for more serious diseases, such as hypertension, diabetes, cancer. Convergently, the current findings confirm the same factor in Egypt, where the vast majority of participants (80%) would agree to use (switch to) a generic medicine if they have a minor medical condition; other wise, only (45%) of the lay public may agree to use (switch to) a generic medicine.

Other factors that also affect a patient's decision to use a generic or a brand medicine, as highlighted by Hassali et al. (2009) and Alrasheedy et al. (2014), in their systematic literature review, include: price difference, prior experience of generic medicines, country development level, pharmaceutical policy environment, reimbursement system, and trust in regulatory authority. The study results and main findings addressed these factors as well, it was evident that price difference is a significant attitude determinant, where most participants (69%) agreed to use (switch to) a generic medicine that is significantly cheaper than the originator (branded) medicine. In contrary, only 20% of the participants would still use generic medicine, even if the price difference with the originator was small.

The experiences from using a generic medicine, and its impact on further use, were explored among the interviewed patients, none reflected on a specific bad experience or incident that can be linked to a generic versus originator comparison. However, at this stage of research and inquiry, and given the employed methodology, a negative answer can not be validated as absence of a phenomenon. Hence, the study acknowledges the need for further research to provide a strong evidence on this dimension of generic medicines. Additionally, physicians

might provide more reliable evidence, given their professional experience, they are capable of better judging whether a side effect or a complication was medicine (drug) specific, disease specific, or attributed to the generic/ originator issue.

Positive knowledge and perceptions of generic medicines were emphasized as necessary prerequisites to the increased and promoted use of generic medicines and their acceptability (Vallès et al., 2003 and Dylst et al., 2013); although "knowledge and awareness do not translate directly into acceptance, and, therefore, use" (Babar et al., 2014, p. 286).

The results of the study presented a clear support for Vallès et al. (2003), Dylst et al. (2013) and Babar et al. (2014), where knowledge emerged as a powerful factor shaping participants' perceptions towards generics, which in turn, as investigated, was a significant determinant of the attitudes towards using generic medicines. Indeed, this may be considered a promising aspect. Knowledge and awareness can, potentially, enhance public trust in both generics and pharmacist advise,

> *"I thought pharmacists suggest substitutes for business related reasons, I have never known that some medicines are exactly equivalent, and that the significant price difference is due to intellectual property rights"* (37-years-old, Multiple Sclerosis Patient, after reading the 'What is a Generic Sheet').

Mr. patient has described how being informed about the concept of generic medicine, understanding that generic is a counterpart product and that the significant price difference is related to the IPR issues have shifted his attitude regarding generic substitution. However, he, too, has shed the light on the trust issue the lay public have against pharmacists' advice!

Convergently, the same pattern of entrusting pharmacists in the first place emerged when participants were asked to choose the single most important factor impacting their decision to use (switch to) a generic medicine; 45% of the participants reported 'physician prescription,' followed by 22% for the 'medical condition,' 15% for the 'price,' and 11% for the 'manufacturing status,' while only 6% reported 'pharmacist advice.' Therefore, despite having 24% of the participants reporting the pharmacists as their source of information about generic medicines, only 6% would accept to use or switch to a generic medicines based on his/her advice.

Overall level of knowledge, Perceptions, and Attitudes, Association to Socioeconomic and Health-related factors, Trend over Time:

Overall, the level of knowledge, perception, and attitudes towards generic medicine were assessed, on a scale of 10; and as highlighted from the study results, the lay Egyptian public have an average of **2.9**, **6.2** and **5.7**, respectively. While, the medical professionals tend to have a corresponding average of **7.5**, **8.7** and **6.5**, respectively.

According to prior studies (Figueiras et al., 2009; Shrank et al., 2009 and Kesselheim et al., 2016), the willingness and acceptability to switch to a generic medicine were found to be associated with the consumers' socioeconomic characteristics, such as: old age and lower level of education. However, divergently from prior evidence, the results of the current study did not detect major statistical associations between the overall level of knowledge, perceptions and attitudes towards generic medicines and the different socio-demographic, economic and health related factors.

The analysis, only, found evidence for slightly significant association between: (1) the knowledge regarding generic medicines and both sex and income level of the participant, where males and very rich people showed significantly higher knowledge of the concept of generic medicines. (2) Perceptions and medication coverage, where medicine users, who cover their medication costs out-of-pocket, tend to have slightly better perceptions towards generic medicines. (3) The attitudes towards using (switching to) a generic medicines and the participant educational level, were a negative association were detected.

However, since the data suggest that Egypt still have a long way to go to improve the knowledge of generic medicines, it is difficult to arrive at a solid conclusion with regards to possible associations of knowledge, perceptions, and attitudes towards generic medicines, with the different socio-demographic and health-related determinants, given the current persistent lack of knowledge.

Regarding the overall trend of how patients and consumers understand and tend to view and trust generic medicines, prior studies and reviewed literature highlighted that patient confidence and knowledge pertaining to generic medicines use have increased over the past four decades, especially in developed countries (Hassali et al., 2009, Keenum et al., 2012, Kesselheim et al., 2016), where "a substantial shift towards more patients having positive views of generic

drugs" was concluded by Kesselheim et al. (2016) based on his national pilot survey in USA. However, since no similar prior studies was identified assessing the Egyptians knowledge, perceptions, and attitudes, the study could not investigate the trend in the Egyptian context.

Possible Policies and State Interventions to Promote Generic Medicine Use:

In the context of pharmaceutical policies, and the need to promote the use of generic medicines as a cost-effective way of improving access and affordability to quality-assured and therapeutically equivalent pharmaceuticals, the demand side measures were extensively highlighted in the literature to enhance and improve generic medicine's use; especially that they were found to be "largely neglected in terms of policy and evaluations" (Kaplan et al., 2012, P.219). Additionally, they were reported as an obstacle facing major countries and threatening the success of their pro-generic policies targeting the supply side (Hoshi & Kimura, 2008).

Therefore, prior studies highly recommended targeting the physicians, pharmacists, and patients using financial incentives together with educational intervention and audit/feedback (Ensor & Cooper, 2004; Kaplan et al., 2012; Dylst et al., 2013 and Moe-Byrne et al., 2014)

Based on the recognized barriers to promoting generics' use in different countries, Kaplan et al. (2012) recommended a three over-arching enabling and promoting conditions: (1) a trusted medicine regulatory authority (MRA/ NRA), (2) a robust market for generics; and (3) the alignment of the pro-generic medicine incentives of prescribers, dispensers and patients as well. Kaplan et al. (2012), additionally, highlighted that policies informed by these conditions should be implemented in an incremental manner and should be monitored and evaluated before they are implemented for the long-term; these policies are necessary, but may be not sufficient.

In accordance to the cited recommendations, the study revealed close results. The generics market in Egypt, although has some imported products; but is dominated by the local industry, especially as a consequence of the 'Boxes' registration system in Egypt, as explained earlier in this study. The Chief Executive Officer (CEO) of one of the leading local pharmaceutical industries discussed the latent potential of the local Egyptian generic industry and its impact on the increased availability and affordability of medications.

> *"Generic pharmaceuticals, especially when couple with a strong regulatory authority that monitor and ensure their quality, offer an extensive affordable access to treatment to an increased number of patients and overall populations,*

whether in Egypt or any country."

Dr. CEO showed a deep understanding of the value and impact generic medicines might have, where they improve patients' accessibility to treatments while ensuring comparable safety and efficacy. Yet, he highlighted on of the central and most important factors beyond generics' enabling factors which is the 'a functioning regulatory authority,' which is the main insurance for all the claimed therapeutic equivalency between the generic and branded innovator product.

He praised the high capacity and production standards of the Egyptian manufacturing facilities, in general, where Egypt has one of the largest pharmaceutical industry in the region. Its historical expertise and sizeable infrastructure has developed since the 1930s. Dr. CEO reflected about the significant role played recently by the locally produced generic medicines in the success of the '100 Million Health Campaign,'

> *"Thanks to the local generic pharmaceutical industry, the Egyptian government was able to fulfill its promised obligation of screening the Egyptian population against hepatitis C virus (HCV) and to offer the diagnosed patients the needed treatments. The local industry supplied the generic equivalents of the advanced HCV treatment for a fraction of its international price."*
>
> (The CEO of a local pharmaceutical company).

Again Dr. CEO, as the head of one of the local pharmaceutical companies, reflected on the local and generic industry and its potential of improving the accessibility and affordability of medications. He described how the local pharmaceutical manufacturers were able to supply the recent medications treating Hepatitis C virus 'HCV' for a small fraction of the international price, and hence, being a sustainable partner for the achieved success of the 100 million health campaign. Basically, this is the ultimate value of generic medicines providing therapeutically equivalent and cost-effective pharmaceutical products.

Given the dynamics of prescription and counselling in the Egyptian market, Dr. CEO highlighted that although physicians continue to have a dominant role in the prescription of medications, using the company's specific trade name; the increased role of pharmacist in the healthcare team and their influential role as medicine-experts is foreseeable. Pharmacist are, gradually, gaining more influential roles in the pharmaceutical sector.

The alignment of the pro-generic medicine incentives of physicians (prescribers),

pharmacists (dispensers) and patients (users) is a prominent theme that emerged and underlined from the different stakeholders involved in the pharmaceutical sector. The price or cost of generic medicines is obviously important; since cost is the reason generic medicines are considered in the first place, nevertheless, financials incentives were highlighted as a prominent factor to promote the use of generic medicines.

> *"The pharmacists profit margin favors dispensing the most expensive products, once the patients can financially afford the expensive brand, why should I advise him about the less expensive generic"* (Pharmacist, Branch Manager in one of the Chain Pharmacies).

The regulated profit margins introduce another challenge against the wide and promoted use of the cost-effective generic products, where pharmacists have a direct financial benefit from dispensing and selling expensive products (the majority of which are imported), compared to selling the lower prices locally manufactured products. The profit margins and its regulation were highlighted earlier, Box 3, and though theoretically the pharmacist profit margin form locally manufactured product (30% of the distributor price) is higher than that of the imported product (22.9% of the distributor price), yet this point was highlighted from the interviewed pharmacists, who expressed different degrees of considering it a focal point, another pharmacist noted:

> *"Once approached by a patient/customer, and even for OTC medicines, a good profitability is achieved via the most expensive products, not the less expensive generic equivalents. However, I, definitely, give my customers a number of options regarding generics, depending of their apparent socio-economic level"* (pharmacist, working at his privately owned community pharmacy for 18 years)

This pharmacist who operates his privately owned community pharmacy has, also, expressed how good profitability is linked directly to selling the expensive pharmaceutical products. He claimed, ethically and from a moral perspective, giving his patients (customers) a number of options according to their classified apparent economic level. However, the way that the financial mark-ups and profit margins are designed raises the need to question the structure of the financial incentives and the need to restructure them from a policy perspective.

In the same context, it was confirmed how pharmacists should have proper incentives to promote generics' use . As a pharmaceutical company, they target, principally, physicians with their promotional materials; however, they target also pharmacists

> *"within the allowed percentages and trade-related norms, the sales and marketing team targets, principally, physicians. However, pharmacist too should have incentive of some kind to promote dispensing a generic version, once their advice was sought"* (The CEO of a local pharmaceutical company)

Dr. CEO has explained how, as a pharmaceutical company, they position physicians as the primary focus and recipient of their promotional and marketing activities. Yet, he spotted the need to incentivize pharmacists too. He reflected on the latent dilemma raised now and then between physicians and pharmacist about the right to prescribe medications based on the written physician diagnosis, unsolved yet and may take years to settle, and given the current context, the different informants highlighted the persistent need to review the incentive structure for both physicians and pharmacists.

While Pharmacist incentives could be financial through restructuring the mark-up (profit) regulations to encourage pharmacist dispensing lower priced generics. It would be more challenging to think about and enforce physicians' incentives in the light of the widely prevalence private clinics operating everywhere in the country; such dynamics might change if the newly implemented Health Insurance started to realize on-ground successes and credibility!

In general, and as discussed by Toverud et al. (2015), Dr. CEO confirmed that patients and physicians trust in the generic medicines is just a reflection of their trust in the *'Health Regulatory Authority,' where the Egyptian NRA,* together with the different media platforms, should target both healthcare providers (mainly physicians), as well as patients and lay public with an awareness and educational campaigns to raise the awareness about their regulatory role, and the technical requirements for registering and, hence, marketing a pharmaceutical product.

> *"Generic medicines' penetration is such a tricky and challenging process, for a medicine, which have a rapid effect that can be measured, anti-coagulant, we have provided physicians with sample together with a kit (measuring instrument) to measure blood fluidity as a proof of effectiveness. Most physicians get very conservatives when it comes to Narrow Therapeutic Index medications as well"*

As highlighted in different contexts, it is a matter of trust. Dr. CEO elaborated on describing how tricky and challenging it is to convince physicians about the efficacy of their generic products, especially those with 'narrow therapeutic index,' or in other word those medications where a minor change in the dose or concentration can lead to serous side-effects. He described that physicians tend to trust generics in this case based on seen and proven evidence, which might not always be the case, for example one of his company's products was anti-coagulant, which is a product that prevent blood coagulation and keeps its fluidity, a characteristic that can be easily tested at the clinic, therefore in their marketing activities, they provided the physicians with a sample together with validating instrument so as to validate the result himself.

Although this special group of medications (NTI) are beyond the scope of this research study as highlighted earlier, yet, with such diminished levels of trust it is highly intuitive to ask whether Egyptian physicians understand and trust the activities of the health regulatory authority at the first place, or whether the activities of the regulatory authority are effective and successful in achieving their mandate?

When asked directly, participants indicated that they trust the health regulatory authority, however, trust emerged as a prominent challenge. The question of trusting the EDA as a formal authority and regulatory body responsible of ensuring the safety, efficacy, and quality of the different pharmaceuticals prior to their marketing, as well as following up on their safety can be phrased into a more profound one of whether the exhibited diminished trust in the EDA is just a reflection of the wavering citizen – government trust dilemma.

Chapter Seven: Conclusion and Recommendations

Conclusion:

Generic medicines can provide substantial savings to the healthcare system and individual patients in Egypt. The present study highlighted that there is a lack of knowledge in the understanding of the concept of generic medicine among the lay public; a considerable majority of lay public lacks adequate knowledge or have insufficient correct information about generic medicines. The study, also, highlighted a gap in medical professionals' knowledge and understanding of generic medicines, despite their educational and professional background. Two characteristics of generic medicines were widely confused among both lay public and medical professionals; where generics were confused as the locally manufactured pharmaceuticals per se, compared to innovator pharmaceuticals (originator branded) as the imported ones; also, it was widely confused that generics are substitutes, not exactly similar to the originator pharmaceutical.

Broadly translated the findings of the study indicate that lay public held negative perceptions towards generic medicines; the overall perception level assessed to be mediocre (6.2 out of 10), compared to medical professional participants whose overall perceptions, as well as perceptions of effectiveness, safety, and cost were, somehow, higher than that of the lay public, but still negative perceptions are prevailing.

Generic medicines are registered via a rigorous scientific based registration system to ensure their effectiveness, safety, quality and bioequivalence. Besides, a post-marketing follow-up and monitoring system is currently implemented to detect any safety or quality issues that may arise after registration (EDA, n.d.). Nevertheless, the perception of quality as well as trust in regulatory authority ascertain the need for attention and state interventions, where both lay public and medical professionals showed low levels of trust in these dimensions.

In general, and controlling for other variables, both pharmacists and physicians exhibited a higher knowledge level about the concept of generic medicines, however, physicians reflected a significantly lower perceptions and worse attitudes towards generic medicine.

Generic medicines are commonly used given the Egyptian context, around 80% of the study participants confirmed their actual prior use of generic medicines. However, spending on

generics constitutes 32.2% of overall spending on health in Egypt, compared with other Middle Eastern countries[22] ranging from 18.4% - 48.3% (Kanavos et al., 2018). Therefore, an immense room of improved efficiency in the pharmaceutical spending and healthcare utilization can be achieved through further generics use.

Participants showed varied attitudes towards their acceptability and readiness to use (switch to) a generic medicine. In general, 50% of the lay public and 39% of the medical professionals reflected their preference to, always, choosing an originator medicine, if given the choice. The impact of different attitudes' determinants was assessed in the study; *physician prescription* emerged as the prominent factor; followed by the *medical condition*; and, then, the *price* factor. Convergently, 45% of the participants reported that the single most important factor impacting their decision to use (switch to) a generic medicine is the 'physician prescription,' followed by 22% for the 'medical condition,' 15% for the 'price,' and 11% for the 'manufacturing status,' while only 6% reported 'pharmacist advice.' Which confirms the, still, dominant influential power excreted by the physician. The implication of these findings can be translated into prioritized policies and state-driven interventions targeting physician awareness first, while allowing for some room for improved generic prices.

Knowledge emerged as a powerful factor shaping the participants' perceptions towards generics, which in turn, as investigated, was a significant determinant of the attitudes towards using generic medicines. Indeed, this may be considered a promising aspect, where it would be rational to infer that high levels of information regarding generic medicines, and enhanced knowledge-based communication, with both medical professionals and lay public, will help to increase the level of trust upon generics, dissolve quality-equivalence skepticism, and acknowledge their efficient contribution towards reducing the healthcare costs and effectively reallocating health resources. Hence after, generic prescription and generic substitution as popular and successful policies, in other countries, could be supported and endorsed.

The present findings refute the association between socio-demographic and general health-related factors, with and the level of knowledge, perceptions, and attitudes towards generic medicines. However, since the data suggest that Egypt still have a long way to go to

[22] The countries of Algeria, Bahrain, Egypt, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, UAE

improve the knowledge of generic medicines, it is difficult to arrive at a solid conclusion with regards to possible associations of knowledge, perceptions, and attitudes towards generic medicines, with the different socio-demographic and health-related determinants, given the current persistent lack of knowledge. Henceforth, future research could continue to investigate these possible associations.

Collectively, the results appear consistent with the findings in other countries; its adds to the growing corpus of research showing the persistent need for improving and continuously discussing lay public and medical professionals' knowledge regarding generic medicines, especially in the context of LMICs. Despite the study limitations, the results provide potentially valuable insights that can be utilized by pharmaceutical and health policy makers as well as other stakeholders in order to promote the trustful use and attitudes towards generic medicines.

Recommendations:

The findings of the study stress the need to effectively boost the knowledge-based, trustful use and attitudes towards generic medicines, where pharmaceutical and health policy makers should work, jointly, with the different stakeholders—mainly the pharmaceutical industry, medical syndicates, medical professionals, patient support groups as well as the lay public— in order to promote the use of generic medicines and minimize the number of patients (and medical professionals) whose decisions to avoid generics were related to lack of knowledge or misinformation about their therapeutic interchangeability. This could be achieved through enhancing the demand side activities parallel to the different supply-side initiatives discussed earlier. A number of recommendations can be discussed in the light of the study results and findings, including:

- Mass Awareness and Public Educational Campaigns, regarding generic medicines and their benefits, in a simple understandable language and via different channels (mass media, social media, newspapers, etc.). The study shed the light on the lack of utilization of available resources such as mass media in educating public about their medications. Hence, a comprehensive public educational campaign, supervised and enforced through the trusted MOHP/EDA would positively impact consumers' perception of generic medicine. Different formal online initiatives are introduced on the social media, such as the Drug Information Center, the Pharmacovigilance Bulletin, there activities are diverse, however, discrete and

targeting wide spectrum of drug-related information, non, yet, spotted the importance and need to raise awareness about the concept of generic medicines.

- Empowering Medical Professionals, particularly Physicians, with detailed information about generic medicines; the requirements regulating their registration and access to the Egyptian market while ensuring their quality, therapeutic and safety equivalency; the impact of their use in improving medication affordability, adherence, and, subsequently, improved patient health outcomes. The accessible communication between the national regulatory authority (FDA), healthcare professionals and consumers in USA has been credited to enhance trustful use of generic medicines (Hassali et al., 2014).
- A formal reference of therapeutically substitutable medicines, is a highly recommended initiative, where a user friendly online platform or mobile application, supervised by the Egyptian Drug Authority, to provide the medical professionals as well as the lay public with lists of interchangeable products and their prices would definitely promote the trustful use of generic medicines. An online database of the registered medicines is available on the EDA website, but it, certainly, need additional features and improved awareness and communication channels especially with medical professionals.
- A pharmaceutical regulatory course should be offered, and coordinated, in order to ascertain a proper understanding of the regulatory process of pharmaceuticals and the different stages of ensuring pharmaceutical effectiveness, safety, and quality. This course should be available and mandated for medical students, as future physicians they will continue to be a principle factor influencing patients' trust in a medication.
- The Pharmaceutical Regulatory Agency (National Drug Authority) should consider a portfolio of initiatives to familiarize both medical professionals and lay public with its main mandate, activities, communication channels and platforms, etc. Building mutual trust between the regulatory agency and both the medical professional, as well as, the lay public will enhance the quality perceptions among Egyptians and encourage their use of locally manufactured, or even imported, generics
- Given the current dynamics of the Egyptian pharmaceutical market, it might be too early to consider a mandatory *generic prescription* and/or a *generic substitution* policy. However,

health and pharmaceutical policymakers should consider reviewing the incentives structure for both physicians and pharmacist, in collaboration with medical associations and syndicates, so that prescribing and dispensing generic medicines could be encouraged and promoted. These incentives might be financial for pharmacists; by restructuring the mark-up (profit) regulations to encourage pharmacist dispensing lower priced generics.

These recommendations, and further possible interventions, might be thought of as individual policies, or can be drafted by the interested stakeholders—especially the government, patient support programs, and generic manufacturers— into a national strategy to promote the use of generic medicines, the Japanese *"Action Programme for Promotion of the Safe Use of Generic Drugs"* is a good example of promotion programs (MHLW, 2012); it is important to have a comprehensive plan and well-designed promotion program that address, from various perspectives, all aspects related to the generic medicines (Hassali et al., 2014).

On this basis, and referring back to the main research question, the study concludes that Egyptians' positive perceptions and acceptability of generic medicines is still tied behind the barriers of lack of knowledge about this important category of medications, its characteristics and the value it can deliver to the Egyptian market and health care sector; the barriers of proper incentives' structure for both physicians and pharmacists, whose role in the demand side of the Egyptian market is not expected to change soon in the near future.

Away from the knowledge dimension, and the different recommendations to address it on a multi-dimensional level, trust emerged as a crucial facet and a puzzling notion, where many questions need to be addressed. For example, given the vital role of bioequivalence test in ensuring the therapeutic and safety equivalency of both the generic and branded innovator, the question would be, "to what extent 'bioequivalence tests' and 'bioequivalence centers' are credible given the Egyptian context and the professional practice within?"

Furthermore, whether trusting generic medicines in Egypt, or the absence of, hereafter, is a reflection to the overall trust in the public institutions and the governmental process, where a high level of prejudice can be detected? Or it is the result of accumulated experiences and practice even if it lacks the proper documented evidence, in such a case, the whole technical regulatory process should mandate a revision and verification?

Reflecting on the medical professionals, it might be insightful to understand that physicians have a direct stake and benefit from the current dynamics of prescription by trade name (whether originator or generic medicines), where they are the primary target of pharmaceutical companies' promotion and marketing activities, hence, introducing an inquiry about the level of corruption in the pharmaceutical market and its dynamics? And whether the different stakeholders would promote changing the prescription dimensions in Egypt?

All these inquiries points to future research ideas in order to help disentangling the complexity of the issue, and boost the trustful use of generic medicines, given the Egyptian context. Moreover, further research might consider analyzing the results of the medical professionals in a separated way for pharmacists and for physicians, together with, further, linkage to their level of education and certifications; aggregating the different medical professionals in one sample in this study was done for the purpose of giving some insights, however, further specialized research should be considered.

References

Abdellatif, L., & Zaky, M. (2015). Characteristics of private markets and accessibility of small and medium enterprises to public procurement markets: Pharmaceuticals in egypt. Journal of Public Procurement, 15(4), 476-513.

Abdelrahman, A. A., Saad, A. A., Sabry, N. A., & Farid, S. F. (2016). Perceptions of Egyptian physicians about drug shortage during political disturbances: Survey in Greater Cairo. *Bulletin of Faculty of Pharmacy, Cairo University*, *54*(2), 191-196.

Ahram Online. (2013, March 13). *Price controls, currency devaluation fuel drug shortages in Egypt'*. Retrieved April 20, 2019, from Ahram Online: http://english.ahram.org.eg/NewsContent/3/12/66532/Business/Economy/Price-controls,-currency-devaluation-fuel-drug-sho.aspx

Ahire, K., Shukla, M. A. N. I. S. H., Gattani, M. A. H. E. S. H., Singh, V. I. N. A. Y., & Singh, M. E. E. R. A. (2013). A survey based study in current scenario of generic and branded medicines. Int J Pharm Pharm Sci, 5(3), 705-11.

Akaleephan, C., Wibulpolprasert, S., Sakulbumrungsil, R., Luangruangrong, P., Jitraknathee, A., Aeksaengsri, A., ... & Tantivess, S. (2009). Extension of market exclusivity and its impact on the accessibility to essential medicines, and drug expense in Thailand: Analysis of the effect of TRIPs-Plus proposal. Health Policy, 91(2), 174-182.

Al Ameri, M. N., Whittaker, C., Tucker, A., Yaqoob, M., & Johnston, A. (2011). A survey to determine the views of renal transplant patients on generic substitution in the UK. Transplant International, 24(8), 770-779.

Albarraq, A. A. (2013). Consumers' perceptions on generic medicines in Taif city, Saudi Arabia. Saudi Journal for Health Sciences, 2(1), 18.

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. Pharmacy practice, 6(2), 93.

Almarsdóttir, A., & Traulsen, J. (2005a). The argument for pharmaceutical policy. *Pharmacy World & Science, 27*(1), 7-12. doi:10.1007/s11096-004-5151-2

_____ (2005b). Rational use of medicines – an important issue in pharmaceutical policy. *Pharmacy World & Science, 27*(2), 76-80. doi:10.1007/s11096-005-3303-7

_____ (2005c). Cost-containment as part of pharmaceutical policy (vol 27, pg 144, 2005). *Pharmacy World & Science, 27*(4), 355-355. doi:10.1007/s11096-005-2497-z

_____ (2005d). Pharmaceutical policy and the lay public. *Pharmacy World & Science, 27*(4), 273-277. doi:10.1007/s11096-005-8512-6

_____ (2006e). Studying and evaluating pharmaceutical policy—becoming a part of the policy and consultative process. *Pharmacy World & Science, 28*(1), 6-12. doi:10.1007/s11096-006-9011-0

Alrasheedy, A. A., Hassali, M. A., Stewart, K., Kong, D. C., Aljadhey, H., Mohamed Ibrahim, M., & Al-Tamimi, S. K. (2014). Patient knowledge, perceptions, and acceptance of generic medicines: a comprehensive review of the current literature. Patient Intell, 6, 1-29.

American Chamber of Commerce in Egypt [AmCham]. (2017). *Reforms Bear Fruit.* Retrieved April 12, 2019, from The American Chamber of Commerce in Egypt: https://www.amcham.org.eg/publications/industry-insight/issue/5/Reforms-Bear-Fruit

Babar, Z., Stewart, J., Reddy, S., Alzaher, W., Vareed, P., Yacoub, N., Dhroptee, B., & Rew, A. (2010). An evaluation of consumers' knowledge, perceptions and attitudes regarding generic medicines in auckland. Pharmacy World & Science : PWS, 32(4), 440-448. doi:10.1007/s11096-010-9402-0

Babar, Z. U. D., Kan, S. W., & Scahill, S. (2014). Interventions promoting the acceptance and uptake of generic medicines: A narrative review of the literature. Health Policy (Amsterdam, Netherlands), 117(3), 285-296. doi:10.1016/j.healthpol.2014.06.004

Babbie, E. (2007). The practice of social research. 11th. Belmont, CA: Thomson Wadsworth, 24(511), 66.

Babovic, S., & Wasan, K. M. (2011). Impact of the trade-related aspects of intellectual property rights (TRIPS) agreement on India as a supplier of generic antiretrovirals. Journal of pharmaceutical sciences, 100(3), 816-821.

Behmane, D., & Innus, J. (2011). Pharmaceutical policy and the effects of the economic crisis: Latvia. Eurohealth, 17(1), 8

Bertoldi, A. D., Barros, A. J., & Hallal, P. C. (2005). Generic drugs in Brazil: known by many, used by few. Cadernos de saúde pública, 21(6), 1808-1815.

Business Monitor International [BMI]. (2015). *Egypt Pharmaceuticals & Healthcare Report Q2 2015.* London: Business monitor international ltd.

_____. (2010b). *Egypt Pharmaceuticals & Healthcare Report Q2 2015.* London: Business monitor international ltd.

Business Studies & Analysis Center [BSAC], The American Chamber of Commerce in Egypt [AmCham]. (2006). *Pharmaceutical sector developments in Egypt.* Available from: http://www.amcham.org.eg/resources_publications/publications/business_studies/

_____. (2012). *Healthcare and pharmaceuticals in Egypt.* Available from: http://www.amcham.org.eg/resources_publications/publications/business_studies/

Bulsara, C., McKenzie, A., Sanfilippo, F., Holman, C. A. J., & Emery, J. E. (2010). 'Not the full Monty': a qualitative study of seniors' perceptions of generic medicines in Western Australia. Australian Journal of Primary Health, 16(3), 240-245.

Burstall, M. L. (1997). The management of the cost and utilisation of pharmaceuticals in the United Kingdom. Health Policy, 41, S27-S43.

Business Dictionary. (n.d.). Retrieved June 04, 2019, from BusinessDictionary.com website: http://www.businessdictionary.com/definition/attitude.html

Buysse, I. M., Laing, R. O., & Mantel, A. K. (2010). Impact of the economic recession on the pharmaceutical sector. WHO Collaborating Centre For Pharmacoepidemiology & Pharmaceutical Policy Analysis.

Cameron, A., Ewen, M., Ross-Degnan, D., Ball, D., & Laing, R. (2009). Medicine prices, availability, and affordability in 36 developing and middle-income countries: a secondary analysis. The lancet, 373(9659), 240-249.

Cameron, A., Mantel-Teeuwisse, A. K., Leufkens, H. G. M., & Laing, R. O. (2012). Switching from originator brand medicines to generic equivalents in selected developing countries: How much could be saved? Value in Health: The Journal of the International Society for Pharmacoeconomics and Outcomes Research, 15(5), 664-673. doi:10.1016/j.jval.2012.04.004

Campbell, M., Bateman, D. N., Lee, A., Smith, J. M., & Beaney, A. (1995). The pros and cons of generic medicines. Pharmacoeconomics, 8(4), 362-364.

Central Agency for Public Mobilization and Statistics [CAPMAS]. (2017). Egy-CAPMAS-MPRS-July2017. Retrieved April 17, 2019, from https://censusinfo.capmas.gov.eg/Metadata-ar-v4.2/index.php/catalog/1231

Central Bank of Egypt [CBE]. (2019). Net International Reserves. Retrieved from https://www.cbe.org.eg/en/Pages/default.aspx. Accessed April, 2019

_____. (2019). A*nnual Reports (* Retrieved April 12, 2019 from https://www.cbe.org.eg/en/EconomicResearch/Publications/Pages/AnnualReport.aspx.

Chaves, G. C., & Oliveira, M. A. (2007). A proposal for measuring the degree of public health-sensitivity of patent legislation in the context of the WTO TRIPS Agreement. Bulletin of the World Health Organization, 85, 49-56.

Chow, S. C. (2014). Bioavailability and bioequivalence in drug development. Wiley Interdisciplinary Reviews: Computational Statistics, 6(4), 304-312.

Coombes, R. (2009). GPs save£ 400m in 2008 by increasing use of generic drugs. BMJ: British Medical Journal (Online), 338.

Correa, C. M. (2006). Implications of bilateral free trade agreements on access to medicines. Bulletin of the World Health Organization, 84, 399-404.

CPhI (2018). MENA Pharmaceutical Industry: Background and Future Projections. Available from: https://ubm.cphi.com/mena-market-report-2018/

Department of Health. (2009). The proposals to implement 'generic substitution' in primary care,further to the pharmaceutical price regulation scheme (PPRS): Consultation document. Available: http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_110511.pdf

Denoth, A., Pinget, C., & Wasserfallen, J. B. (2011). Citizens' preferences for brand name drugs for treating acute and chronic conditions. Applied health economics and health policy, 9(2), 81-87.

Domeyer, P. J., Aletras, V., Anagnostopoulos, F., Katsari, V., & Niakas, D. (2017). Development and validation of a tool to assess knowledge and attitudes towards generic medicines among students in Greece: the ATtitude TOwards GENerics (ATTOGEN) questionnaire. *PloS one, 12*(11), e0188484.

Domeyer, P. J., Katsari, V., Sarafis, P., Aletras, V., & Niakas, D. (2018). Greek students' attitudes, perception and knowledge regarding generic medicines in times of economic crisis: a cross-sectional study. *BMC medical education, 18*(1), 262.

Dunne, S. S., & Dunne, C. P. (2015). What do people really think of generic medicines? A systematic review and critical appraisal of literature on stakeholder perceptions of generic drugs. BMC medicine, 13(1), 173.

Dylst, P., Vulto, A., & Simoens, S. (2013). Demand-side policies to encourage the use of generic medicines: an overview. Expert review of pharmacoeconomics & outcomes research, 13(1), 59-72.

Egypt, Arab Republic (1950). Law No. 163/1950 on Compulsory Pricing and Profit Regulation. Official Gazette, extraordinary issue (60), 14 September 1950 . Retrieved April 14, 2019, from http://alamiria.laa-eg.com/NewTash/HafzaTash

_____ (1951). Law No. 150/1950 on Criminal Procedures. Official Gazette, issue (60), 15 October 1951

_____ (1955). Law No. 127/1955 on Pharmacy Practice. Official Gazette, issue (20), 10 March 1955. Retrieved April 12, 2019, from http://alamiria.laa-eg.com/NewTash/HafzaTash

_____ (1955). Presidential Decree No. 113/1962 on Regulating Prices. Official Gazette, issue (168), 25 June 1962. Retrieved April 12, 2019, from http://alamiria.laa-eg.com/NewTash/HafzaTash

_____ (2002). Law No. 82/2002 on the Protection of Intellectual Property Rights. Official Gazette (22), 2 June 2002

_____ (2014). The constitution of the Arab Republic of Egypt. https://www.egypt.gov.eg/english/laws/constitution/chp_one/part_one.aspx

_____ (2017a). Law No. 5/2017 on Licensing Industrial Establishment Act. Official Gazette, extraordinary issue (17d), 3 May 2017

_____ (2017b). Law No. 72 /2017 on Investment Act. Official Gazette, extraordinary issue (21c), 31 May 2017

_____ (2018a). Law No. 2/2018 on the Comprehensive / Universal Health Insurance. Official Gazette, issue (2), 11 January 2018. Retrieved April 12, 2019, from http://alamiria.laa-eg.com/NewTash/HafzaTash

_____ (2018b). Law No. 181/2018 on Consumer Rights Protection. Official Gazette, issue (37), 27 September 2018

_____ (2018b). Law No. 182/2018 on Regulating the Contracts Concluded by the Public Institutions. Official Gazette, extraordinary issue (39d), 3 October 2018

_____ (2019). Law No. 151/2019 on Establishing the Egyptian Organization for Unified Procurement, Medical Supply and Medical Technology Management; and the Egyptian Drug Authority. Official Gazette, issue (34a), 25 August 2019

Egyptian Drug Authority [EDA]. (n.d.). Availabe at: http://www.eda.mohp.gov.eg

El-Ahram. (2016, May 16). Ministers' Cabinet Agrees to Increase the Prices of Medicine Less than Thirty Pounds by Twenty Percent, as of Today *' مجلس الوزراء يوافق على زيادة أسعار الدواء الأقل من 30 جنيها 20% اعتبارًا من اليوم'*. Retrieved April 12, 2019, from El-Ahram News Gate: http://gate.ahram.org.eg/News/979291.aspx

El-Ahram. (2016, May 27). Price List of Drugs to which the Increase Decision Applies up to a Maximum of Six Pounds *' قائمة أسعار الأدوية التي ينطبق عليها قرار الزيادة بحد أقصي ٦ جنيهات'*. Retrieved April 12, 2019, from El-Ahram News Gate: http://gate.ahram.org.eg/News/983115.aspx

El-Ahram. (2017, December 12). *2017. General "Shortages" of Medicines Despite the Increase in Prices of More than 3,000 Items. عام "نواقص" صنف آلاف 3 من أكثر أسعار زيادة رغم الأدوية!* Retrieved April 12, 2019, from El-Ahram News Gate: http://gate.ahram.org.eg/News/1661663.aspx

Elmoneer, R. A., Shawky, S., & American University in Cairo. Social Research Center [AUC, SRC]. (2018). Socio-Economic Inequalities in Accessing Treatment of Non-Communicable Diseases in Egypt using Health Issues Survey 2015. Retrieved from http://dar.aucegypt.edu/handle/10526/5681

ExtraNews. (2017, March 5). The Ministers of Health and the Business Sector are Following up the Performance Evaluation Committee of the State Pharmaceutical Companies *وزيري الصحة وقطاع الأعمال يتابعان أعمال لجنة تقييم أداء شركات الأدوية الحكومية!* Retrieved from Extra News: https://www.extranews.tv/extra/category/topic/Extra_وزيري_الصحة_وقطاع_الأعمال_يتابعان_أعمال_لجنة_تقييم_أداء_شركات_الأدوية_الحكومية

Elyoum Elsabee. (2018, September 2018). Restructuring of Pharmaceutical Companies Owned by Health Insurance *هيكلة شركات الأدوية المملوكة للتأمين الصحى*. Retrieved from Elyoum Elsabee News: http://parlmany.youm7.com/News/7/239891/هيكلة-شركات-الأدوية-المملوكة-للتأمين-الصحى

Elmwaten. (2019, March 20). President Al-Sisi Directs the Completion of the Governance of the Performance of Pharmaceutical Companies الرئيس السيسي يوجه بالانتهاء من حوكمة أداء شركات الأدوية. Retrieved from Elmwaten News: https://www.elmwatin.com/611181/عاجلالرئيس-السيسي-يوجه-بالانتهاء-من-حوكمة-أداء-شركات-الأدوية

European Medicines Agency [EMA]. (2012). Q&A on Generic Medicine. Retrieved from: https://www.ema.europa.eu/en/documents/medicine-qa/questions-answers-generic-medicines_en.pdf

Ensor, T., & Cooper, S. (2004). Overcoming barriers to health service access: influencing the demand side. Health policy and planning, 19(2), 69-79.

Faden, L., Vialle-Valentin, C., Ross-Degnan, D., & Wagner, A. (2011). Active pharmaceutical management strategies of health insurance systems to improve cost-effective use of medicines in low-and middle-income countries: a systematic review of current evidence. Health policy, 100(2-3), 134-143.

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(5), 590-594.

Figueiras, M. J., Alves, N. C., Marcelino, D., Cortes, M. A., Weinman, J., & Horne, R. (2009). Assessing lay beliefs about generic medicines: Development of the generic medicines scale. Psychology, health & medicine, 14(3), 311-321.

Gaballah, A., & Knecht, E. (2016, November 22). *Currency drop hits Egypt's medicine supplies, angering public.* Retrieved April 12, 2019, from Reuters: https://www.reuters.com/article/us-egypt-currency-medicine-insight-idUSKBN13H1GC

Gaither, C. A., Kirking, D. M., Ascione, F. J., & Welage, L. S. (2001). Consumers' views on generic medications. Journal of the American Pharmaceutical Association, 41(5), 729-736.

Ganther, J. M., & Kreling, D. H. (2000). Consumer perceptions of risk and required cost savings for generic prescription drugs. Journal of the American Pharmaceutical Association (1996), 40(3), 378-383.

Garattini, L., & Tediosi, F. (2000). A comparative analysis of generics markets in five European countries. Health policy, 51(3), 149-162.

Garfield, S., Smith, F., Francis, S. A., & Chalmers, C. (2007). Can patients' preferences for involvement in decision-making regarding the use of medicines be predicted?. Patient education and counseling, 66(3), 361-367.

Generic Pharmaceutical Association. (2017). Generic drug savings in the US. 10th annual edition. Retrieved from: https://www.accessiblemeds.org/sites/default/files/2017-06/2017-AAM-Access-Savings-Report-2017-web2.pdf

_____. (2018). Generic drug savings in the US. 11th annual edition. Retrieved from: https://accessiblemeds.org/resources/blog/2018-generic-drug-access-and-savings-report

Gibson, T. B., Ozminkowski, R. J., & Goetzel, R. Z. (2005). The effects of prescription drug cost sharing: a review of the evidence. Am J Manag Care, 11(11), 730-740.

Global Pharmacovigilance. (n.d.). Glossary of Drug Safety Terms. Retrieved June 5, 2019, from: https://globalpharmacovigilance.tghn.org/resources/glossary/

Godman, B., Shrank, W., Wettermark, B., Andersen, M., Bishop, I., Burkhardt, T., Garuoliene` , K., Kalaba, M., Laius, O., Joppi, R., Sermet, C., Schwabe, U., Teixeira, I., Tulunay, F.C., Wend- ykowska, K., Zara, C., Gustafsson, L.L., (2010a). Use of generics—a critical cost containment measure for all healthcare professionals in Europe?. Pharmaceuticals, 3(8), 2470-2494.

Godman, B., Shrank, W., Andersen, M., Berg, C., Bishop, I., Burkhardt, T., Garuoliene, K., Herholz, H., Joppi, R., Kalaba, M., Laius, O., Mcginn, D., Samaluk, V., Sermet, C., Schwabe, U., Teixeira, I., Tilson, L., Tulunay, F.C., Vlahovic-Palcevski, V., Wendykowska, K., Wettermark, B., Zara, C., Gustafsson, L.L.,. (2010b). Comparing policies to enhance prescribing efficiency in Europe through increasing generic utilization: changes seen and global implications. Expert review of pharmacoeconomics & outcomes research, 10(6), 707-722.

Godman, B., Wettermark, B., Bishop, I., Burkhardt, T., Fürst, J., Garuoliene, K., ... & Zara, C. (2012a). European payer initiatives to reduce prescribing costs through use of generics. GaBI J, 1(1), 22-27.

Godman, B., Malmström, R., Bennie, M., Sakshaug, S., Burkhardt, T., Campbell, S., ... & Gustafsson, L. L. (2012b). Prescribing restrictions–a necessary strategy among some European countries to enhance future prescribing efficiency?. Reviews in Health Care, 3(1), 5-16.

Gossell-Williams, M., & Harriott, K. (2007). Generic substitution in Jamaica: challenges to improving effectiveness. WHO Drug Information, 21(4), 294-299.

Hassali, M. A., Kong, D. C., & Stewart, K. (2005). Generic medicines: perceptions of consumers in Melbourne, Australia. International Journal of Pharmacy Practice, 13(4), 257-264.

Hassali, M. A., Shafie, A. A., Jamshed, S., Ibrahim, M. I., & Awaisu, A. (2009). Consumers' views on generic medicines: a review of the literature. International Journal of Pharmacy Practice, 17(2), 79-88.

Hassali, M. A., Alrasheedy, A. A., McLachlan, A., Tuan, A. N., AL-Tamimi, S. K., Ibrahim, M. I., & Aljadhey, H. (2014). The Experiences of Implementing Generic Medicine Policy in

Eight countries: A review and Recommendation for a successful promotion of a generic medicine use. *The Saudi Pharmaceutical Journal, 22(4)*, 491-503. doi:10.1016/j.jsps.2013.12.017

Heikkilä, R., Mäntyselkä, P., Hartikainen-Herranen, K., & Ahonen, R. (2007). Customers' and physicians' opinions of and experiences with generic substitution during the first year in finland. *Health Policy, 82*(3), 366-374. doi:10.1016/j.healthpol.2006.10.006

Hensler, K., Uhlmann, C., Porschen, T., Benecke, R., & Rösche, J. (2013). Generic substitution of antiepileptic drugs—A survey of patients' perspectives in Germany and other German-speaking countries. Epilepsy & Behavior, 27(1), 135-139.

Health Insurance Organization Egypt [HIO]. (2016). نسبة التغطية التأمنية لعدد السكان. [Public government website]. Retrieved April 30, 2016, from http://www.hio.gov.eg/Ar/covers/Pages/Charts4.aspx

Horne, R. (1999). Patients' beliefs about treatment: the hidden determinant of treatment outcome?.

Hoshi, S., & Kimura, H. (2008). Questionnaire on the awareness of generic drugs among outpatients and medical staff. Drug Discov Ther, 2(3), 194-199.

Ibrahim, R., McKinnon, R. A., & Ngo, S. N. (2012). Knowledge and perceptions of community patients about generic medicines. Journal of Pharmacy Practice and Research, 42(4), 283-286.

Iizuka, T. (2009). Generic entry in a regulated pharmaceutical market. The Japanese Economic Review, 60(1), 63-81.

Institute for Health Metrics and Evaluation [IHME]. (2018). GBD Compare Data Visualization. Seattle, WA: IHME, University of Washington. Retrived April 1, 2019 from http://vizhub.healthdata.org/gbd-compare

Intercontinental Medical Statistics Health [IMS]. (n.d.). Retrieved from: http://www.imshealth.com

imarc (2018). Generic Drugs Market: Global Industry Trends, Manufacturing Process, Share, Size, Growth, Opportunity and Forecast 2018-2023. Retrieved April 26, 2019 from: https://www.imarcgroup.com/generic-drug-manufacturing-plant

Insider, B., & Holodony, E. (2016, November 4). *Egypt just Massively Devalued its Currency — Here's What Happens Next.* Retrieved April 12, 2019, from Business Insider: https://www.businessinsider.com/egypt-unpegs-the-egyptian-pound-from-us-dollar-2016-11

The International Society for Pharmacoeconomics and Outcome Research [ISPOR]. (2012). ISPOR Global Health Care Systems Road Map: Egypt. Retrieved from https://www.ispor.org/?aspxerrorpath=/%20htaroadmaps/egyptph.asp and https://www.ispor.org/HTARoadMaps/EgyptPH.asp

Kanavos, P., Tzouma, V., Fontrier, A. M., Kamphuis, B., Parkin, G. C., & Saleh, S. (2018). Pharmaceutical pricing and reimbursement in the Middle East and North Africa region.

Kaplan, W. A., Ritz, L. S., Vitello, M., & Wirtz, V. J. (2012). Policies to promote use of generic medicines in low and middle income countries: A review of published literature, 2000-2010. *Health Policy (Amsterdam, Netherlands), 106*(3), 211-224. doi:10.1016/j.healthpol.2012.04.015

Kaplan, W. A., & Wirtz, V. J. (2014). A research agenda to promote affordable and quality assured medicines. Journal of Pharmaceutical Policy and Practice, 7(1), 2-2. doi:10.1186/2052-3211-7-2

Keenum, A. J., DeVoe, J. E., Chisolm, D. J., & Wallace, L. S. (2012). Generic medications for you, but brand-name medications for me. Research in social and administrative pharmacy, 8(6), 574-578.

Kesselheim, A. S., Gagne, J. J., Franklin, J. M., Eddings, W., Fulchino, L. A., Avorn, J., & Campbell, E. G. (2016). Variations in patients' perceptions and use of generic drugs: results of a national survey. Journal of general internal medicine, 31(6), 609-614.

Kessomboon, N., Limpananont, J., Kulsomboon, V., Maleewong, U., Eksaengsri, A., & Paothong, P. (2010). Impact on access to medicines from TRIPS-Plus: a case study of Thai-US FTA. Southeast Asian Journal of Tropical Medicine and Public Health, 41(3), 667.

King, G., Keohane, R. O., & Verba, S. (1994). Designing social inquiry: Scientific inference in qualitative research. Princeton university press.

King, D. R., & Kanavos, P. (2002). Encouraging the use of generic medicines: implications for transition economies. Croatian medical journal, 43(4), 462-469.

Kjoenniksen, I., Lindbaek, M., & Granas, A. G. (2006). Patients' attitudes towards and experiences of generic drug substitution in Norway. Pharmacy World and Science, 28(5), 284-289.

Kobayashi, E., Satoh, N., & Ueda, S. (2011a). Community pharmacists' perspectives on generic substitution in Japan. Journal of Public Health, 19(3), 249-256.

Kobayashi, E., Karigome, H., Sakurada, T., Satoh, N., & Ueda, S. (2011b). Patients' attitudes towards generic drug substitution in Japan. Health policy, 99(1), 60-65.

Kotler, P. (1965). Behavioral models for analyzing buyers. *The Journal of Marketing*, 37-45.

Leopold, C., Mantel-Teeuwisse, A. K., Vogler, S., Valkova, S., de Joncheere, K., Leufkens, H. G. M., Wagner, A. K., Ross-Degnan, D., & Laing, R. (2014). Effect of the economic recession on pharmaceutical policy and medicine sales in eight European countries. *Bulletin of the World Health Organization, 92*(9), 630-640D. doi:10.2471/BLT.13.129114

Lebanova H, Manolov D, Getov I. (2012). Patients' attitudes about generics – Bulgarian perspective. *Marmara Pharm J.*

Maniadakis, N., Kourlaba, G., Shen, J., Holtorf, A. P., & Kalo, Z. (2013). Mapping and analysing pharmaceutical policy settings worldwide. Value in Health, 16(7), A487-A487. doi:10.1016/j.jval.2013.08.952

Marshall, C., & Rossman, G. B. (2011). *Designing qualitative research* (5th ed.). Los Angeles: Sage.

Merriam Webster. (n.d.). Glossary. Retrieved June 5 , 2019, from: https://www.merriam-webster.com/dictionary/perception#other-words

Ministry of Health Labour and Welfare of Japan [MHLW]. (2012). Policy report: Promotion of the use of generic drugs [Online]. Available: https://www.mhlw.go.jp/english/policy_report/2012/09/120921.html

Mosby's Medical Dictionary, 8th edition. (2009). Retrieved 15 April 2019 from https://medical-dictionary.thefreedictionary.com/

Moe-Byrne, T., Chambers, D., Harden, M., & McDaid, C. (2014). Behaviour change interventions to promote prescribing of generic drugs: a rapid evidence synthesis and systematic review. BMJ open, 4(5), e004623.

Ministry of Health and Population [MOHP]. (1991). Minister Decree Number 314 for the Year 1991 on Rules and Principles of Pricing of Locally Produced Medicines and Pharmaceutical Preparations and Profit Regulation thereof. Official Gazette (272), 1 December 1991 Retrieved April 12, 2019, from http://alamiria.laa-eg.com/NewTash/HafzaTash

_____. (1994). Minister Decree Number 312 for the Year 1994 on Regulating Importation and Exportations. Retrieved April 12, 2019, from http://alamiria.laa-eg.com/NewTash/HafzaTash

_____. (2009). Minister Decree Number 297 for the Year 2009 on the Registration of Biological Human Pharmaceutical Preparations. Retrieved April 12, 2019, from http://alamiria.laa-eg.com/NewTash/HafzaTash

_____. (2009). Minister Decree Number 373 for the Year 2009 on Pricing of Human Pharmaceutical Preparations. Official Gazette (220), 24 September 2009. Retrieved April 12, 2019, from http://alamiria.laa-eg.com/NewTash/HafzaTash

_____. (2012). Minister Decree Number 499 for the Year 2012 on Pricing of Human Pharmaceutical Preparations. Official Gazette (153), 3 July 2012. Retrieved April 12, 2019, from http://alamiria.laa-eg.com/NewTash/HafzaTash

_____. (2015). Minister Decree Number 425 for the Year 2015 on Rules and Principles for Registering Pharmaceutical Products. Retrieved April 12, 2019, from http://alamiria.laa-eg.com/NewTash/HafzaTash

_____. (2016a). Minister Decree Number 26 for the Year 2016 on Pharmaceutical Track and Trace System. Official Gazette (36), 14 February 2016. Retrieved April 12, 2019, from http://alamiria.laa-eg.com/NewTash/HafzaTash

_____. (2016b). Minister Decree Number 820 for the Year 2016 on Accelerated Registeration. Retrieved April 12, 2019, from http://alamiria.laa-eg.com/NewTash/HafzaTash

_____. (2017). Minister Decree Number 23 for the Year 2017 on Price Increases. Retrieved April 12, 2019, from http://alamiria.laa-eg.com/NewTash/HafzaTash

_____. (2018). Minister Decree Number 645 for the Year 2018 on Pharmaceuticals' Registration Over the Boxes. Official Gazette (264), 24 November 2018. Retrieved April 12, 2019, from http://alamiria.laa-eg.com/NewTash/HafzaTash

Ministry of Health and Population/Egypt, El-Zanaty and Associates/Egypt, and ICF International [MOHP, El-Zanaty & ICF]. (2015). Egypt Health Issues Survey 2015. Cairo, Egypt: Ministry of Health and Population/Egypt and ICF International.

Management Sciences for Health [MSH]. (2012). MDS-3: Managing Access to Medicines and Health Technologies. Arlington, VA: Management Sciences for Health.

Murshid, M. A., & Mohaidin, Z. (2017). Models and theories of prescribing decisions: A review and suggested a new model. *Pharmacy Practice (Granada)*, *15*(2).

Musgrove, P. (1987). The economic crisis and its impact on health and health care in Latin America and the Caribbean. International Journal of Health Services, 17(3), 411-441.

Office of the United Nations High Commissioner for Human Rights [OHCHR] and World Health Organization [WHO]. (2008). The Right to Health. Fact sheet no. 31, (2008). Retrieved from: https://www.ohchr.org/Documents/Publications/Factsheet31.pdf

Paveliu, M. S., Bengea, S., & Paveliu, F. S. (2011). Generic substitution issues: brand-generic substitution, generic-generic substitution, and generic substitution of Narrow Therapeutic Index (NTI)/critical dose drugs. Maedica, 6(1), 52.

Petrou, P., & Vandoros, S. (2015). Cyprus in crisis: recent changes in the pharmaceutical market and options for further reforms without sacrificing access to or quality of treatment. *Health Policy*, *119*(5), 563-568.

Pharmaceutical Executive Editors (2018). Middle East and Africa Pharma Economy to Reach $38.8 BN by 2021. Available from: http://www.pharmexec.com/middle-east-and-africa-pharma-economy-reach-388-bn-2021. Accessed April, 2019

Pharmaceutical Health Information Systme [PHIS]. (n.d.) Glossary. Retrieved from: https://phis.goeg.at/index.aspx?_nav0017

Phuong, J. M., Penm, J., Chaar, B., Oldfield, L. D., & Moles, R. (2019). The impacts of medication shortages on patient outcomes: A scoping review. PloS one, 14(5), e0215837.

PwC Middle East. (2017). *The EGP Devaluation: A new beginning.* Retrieved April 12, 2019, from PwC Middle East: https://www.pwc.com/m1/en/publications/the-egp-devaluation-a-new-beginning.html

Quintal, C., & Mendes, P. (2012). Underuse of generic medicines in Portugal: an empirical study on the perceptions and attitudes of patients and pharmacists. Health policy, 104(1), 61-68.

Rana, P., & Roy, V. (2015). Generic medicines: Issues and relevance for global health. Fundamental & Clinical Pharmacology, 29(6), 529-542. doi:10.1111/fcp.12155

Roberts, R. J., Kauffman, R. E., Mirkin, B. L., Rumack, B. H., Snodgrass, W., & Spielberg, S. P. (1987). Generic prescribing, generic substitution, and therapeutic substitution. Pediatrics, 79(5).

Roszkowska-Hołysz, D. (2013). Determinants of consumer purchasing behaviour/Uwarunkowania zachowań nabywczych konsumentów w świetle teorii zachowań konsumentów. *Management*, *17*(1), 333-345.

Rovira, J., Abbas, I., & Cortés, M. (2009). Guide to the IPRIA (intellectual property rights impact aggregate) model.

Roy, V., & Rana, P. (2018). Prescribing generics: All in a name. The Indian Journal of Medical Research, 147(5), 442-444. doi:10.4103/ijmr.IJMR_1940_17

Rüütel, D., & Pudersell, K. (2011). Pharmaceutical policy and the effects of the economic crisis: Estonia. Eurohealth, 17(1), 5.

Sansgiry, S. S., Bhosle, M., & Pope, N. (2005). Consumer perceptions regarding generic drug substitution: an exploratory study. Journal of Pharmaceutical Marketing & Management, 17(1), 77-91.

Seiter, A. (2010). *A practical approach to pharmaceutical policy.* World Bank.

Sewell, K., Andreae, S., Luke, E., & Safford, M. M. (2012). Peer Reviewed: Perceptions of and Barriers to Use of Generic Medications in a Rural African American Population, Alabama, 2011. Preventing chronic disease, 9.

Shafie, A. A., & Hassali, M. A. (2008). Price comparison between innovator and generic medicines sold by community pharmacies in the state of Penang, Malaysia. Journal of Generic Medicines, 6(1), 35-42.

Sharrad, A. K., & Hassali, M. A. (2011). Consumer perception on generic medicines in Basrah, Iraq: Preliminary findings from a qualitative study. Research in Social and Administrative Pharmacy, 7(1), 108-112.

Sheppard A. (2011) Generic Medicines: Essential Contributors to the Long-Term Health of Society. IMS Health, London. Available at: https://www.medicinesforeurope.com/wp-content/uploads/2016/03/IMS_Generic_Medicines_Essential_contributors.pdf

Shrank, W. H., Cox, E. R., Fischer, M. A., Mehta, J., & Choudhry, N. K. (2009). Patients' perceptions of generic medications. Health affairs, 28(2), 546-556.

Shrank, W. H., Choudhry, N. K., Liberman, J. N., & Brennan, T. A. (2011). The use of generic drugs in prevention of chronic disease is far more cost-effective than thought, and may save money. Health Affairs, 30(7), 1351-1357.

Sicras-Mainar, A., & Navarro-Artieda, R. (2012). Physicians' and patients' opinions on the use of generic drugs. Journal of pharmacology & pharmacotherapeutics, 3(3), 268.

Simoens, S. (2009). Developing the Japanese generic medicines market: what can we learn from Europe?. Journal of Generic Medicines, 6(2), 129-135.

Simoens, S., & De Coster, S. (2006). Sustaining generic medicines markets in Europe. Journal of Generic Medicines, 3(4), 257-268.

Simou, E., & Koutsogeorgou, E. (2014). Effects of the economic crisis on health and healthcare in Greece in the literature from 2009 to 2013: a systematic review. Health policy, 115(2-3), 111-119.

Skaltsas, L. N., & Vasileiou, K. Z. (2015). Patients' perceptions of generic drugs in Greece. Health policy, 119(11), 1406-1414.

Suryawati S, Ross-Degnan, D., Slamet, L.S., Nurita, P. & Hogerzeil, H. (2004). Impact of the economic crisis on availabiltiy, price and use of medicines in Indonesia 1997-2002. World Health Organisation.

Tashakkori, A., & Creswell, J. W. (2007). Exploring the nature of research questions in mixed methods research: Sage Publications Sage CA: Los Angeles, CA.

Thomas, R., & Vitry, A. (2009). Consumers' perception of generic medicines in community pharmacies in malaysia. Southern Med Review, 2(2), 20.

Trading Economics (2019). Egypt Foreign Exchange Reserves. Available from: https://tradingeconomics.com/egypt/foreign-exchange-reserves . Accessed April, 2019

Toklu, H. Z., Dülger, G. A., Hıdıroğlu, S., Akici, A., Yetim, A., Gannemoğlu, H. M., & Güneş, H. (2012). Knowledge and attitudes of the pharmacists, prescribers and patients towards generic drug use in Istanbul–Turkey. Pharmacy practice, 10(4), 199.

Toverud, E. L., Røise, A. K., Hogstad, G., & Wabø, I. (2011). Norwegian patients on generic antihypertensive drugs: a qualitative study of their own experiences. European journal of clinical pharmacology, 67(1), 33-38.

Toverud, E., Hartmann, K., & Håkonsen, H. (2015). A systematic review of physicians' and pharmacists' perspectives on generic drug use: What are the global challenges? *Applied Health Economics and Health Policy,* doi:10.1007/s40258-014-0145-2

United Nations Development Programme [UNDP]. (2015). Sustainable Development Goals. Sustainable Development Knowledge Platform. Retrieved from: http://www.undp.org/content/dam/undp/library/corporate/brochure/SDGs_Booklet_Web_En.pdf

US Food and Drug Administration [US FDA]. (n. d.). Center for Drug Evaluation and Research; Generic Drugs. Available from: https://www.fda.gov/drugs/resourcesforyou/consumers/questionsanswers/ucm100100.htm

_____. (2017a). Generic Competition and Drug Prices. Available from: https://www.fda.gov/AboutFDA/CentersOffices/OfficeofMedicalProductsandTobacco/CDER/ucm129385.htm

_____. (2017b). Drugs@FDA Glossary of Terms. Available from: https://www.fda.gov/drugs/drug-approvals-and-databases/drugsfda-glossary-terms#ther_biological

_____. (2018). Generic Drug Facts. Available from: https://www.fda.gov/drugs/generic-drugs/generic-drug-facts and https://www.fda.gov/media/89135/download

Vallès, J., Barreiro, M., Cereza, G., Ferro, J., Martí, nez, M., . . . Generic Drug Study Grp. (2003). A prospective multicenter study of the effect of patient education on acceptability of generic prescribing in general practice. *Health Policy, 65*(3), 269-275. doi:10.1016/S0168-8510(03)00018-6

Van Thiel, S. (2014). Research methods in public administration and public management: an introduction. Routledge.

Vandoros, S., & Stargardt, T. (2013). Reforms in the Greek pharmaceutical market during the financial crisis. Health policy, 109(1), 1-6.

Vogler, S. (2012). The impact of pharmaceutical pricing and reimbursement policies on generics uptake: Implementation of policy options on generics in 29 european countries─an overview. Generics and Biosimilars Initiative Journal, 1(2), 93-100. doi:10.5639/gabij.2012.0102.020

Vogler, S., Zimmermann, N., Leopold, C., & de Joncheere, K. (2011). Pharmaceutical policies in European countries in response to the global financial crisis. Southern med review, 4(2), 69.

Vogler, S., Zimmermann, N., & de Joncheere, K. (2016). Policy interventions related to medicines: Survey of measures taken in european countries during 2010–2015. Health Policy, 120(12), 1363-1377. doi:10.1016/j.healthpol.2016.09.006

Waber, R. L., Shiv, B., Carmon, Z., & Ariely, D. (2008). Commercial features of placebo and therapeutic. Jama, 299(9), 1016-7.

Wanis, H. (2015). Pharmaceutical Pricing in Egypt. In Pharmaceutical Prices in the 21st Century (pp. 59-78). Adis, Cham.

Waters, H., Saadah, F., & Pradhan, M. (2003). The impact of the 1997–98 East Asian economic crisis on health and health care in Indonesia. Health policy and planning, 18(2), 172-181.

World Health Organization [WHO]. (n.d.). Health financing: Out-of-pocket payments, user fees and catastrophic expenditure. Retrieved from https://www.who.int/health_financing/topics/financial-protection/out-of-pocket-payments/en/

_____. (1995). Public - Private Roles in the Pharmaceutical Sector: Implications for Equitable Access and Rational Use of Drugs. Retrieved from https://apps.who.int/medicinedocs/en/d/Jwhozip27e/

_____. (2001). How to develop and implement a national drug policy. Available from: http://apps.who.int/medicinedocs/en/d/Js2283e/

_____. (2002). Essential Medicines and Health Products Information Portal; The Importance of Pharmacovigilance - Safety Monitoring of Medicinal Products. Retrieved from: http://apps.who.int/medicinedocs/en/d/Js4893e/#Js4893e%5D

_____. (2004). Essential Medicines and Health Products Information Portal; The World Medicine Situation. Available from: http://apps.who.int/medicinedocs/en/d/Js6160e/6.html

_____. (2007). A Model Quality Assurance System for Procurement Agencies. Available from: http://apps.who.int/medicinedocs/en/m/abstract/Js21492en/

_____. (2018). Addressing the global shortage of, and access to, medicines and vaccines. Geneva: WHO.

_____. (2009a). Measuring transparency in the public pharmaceutical sector: Assessment Instrument. World Health Organization. Available: http://www.who.int/medicines/areas/policy/goodgovernance/documents/en/index.html

_____. (2015). WHO Guideline on Country Pharmaceutical Pricing Policies. Geneva: WHO. Retrieved from http://apps.who.int/medicinedocs/documents/s21016en/s21016en.pdf

_____. (2014). Medicines Regulatory Package. A Collection of Tools for Medicines Regulatory Authorities - Regulatory Support Series No. 014. Retrieved from: http://apps.who.int/medicinedocs/en/m/abstract/Js16234e/

_____. (2015). WHO Guideline on Country Pharmaceutical Pricing Policies. Geneva: WHO. Retrieved from http://apps.who.int/medicinedocs/documents/s21016en/s21016en.pdf

_____. (2017). Non-Communicable Diseases progress monitor 2017. Retrieved from http://www.who.int/nmh/publications/ncd-progress-monitor-2017/en/

_____. (2018a). Addressing the global shortage of, and access to, medicines and vaccines. Geneva: WHO.

_____. (2018b). Non Communicable Diseases. Retrieved from https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases

World Bank Data. 2019. Retrieved March 31, 2019, from https://data.worldbank.org/?name_desc=false

World Health Organization & Health Action International [WHO, HAI]. (2004). *Medicines prices in Egypt: Egypt survey report.* Available from: http://www.haiweb.org/medicineprices/related/index.html

_____. (2008). *Measuring Medicine Prices, Availability, Affordability and Price Components (2nd Edition).* Available from: https://www.who.int/medicines/areas/access/medicines_prices08/en/

_____. (2014). Egypt Prices and Affordability of medicines to treat non-communicable diseases. Retrieved April 13, 2019, from http://www.haiweb.org/medicineprices/surveys/201309EG/sdocs/NCD_Pharma_Report_Egypt.pdf

Wibulpolprasert, S., Tangcharoensathien, V., & Lertiendumrong, J. (1998). The economic crisis and responses by the health sector in Thailand 1997–1998. Bangkok, Health Systems Research Institute. Paper presentation at the Regional Consultation on Health Implications of the Economic Crisis in the Southeast Asia Region, 23-25.

Wong, Z. Y., Hassali, M. A., Saleem, F., Mohamad Yahaya, A. H., & Aljadhey, H. (2014). Translation and validation of the Malaysian version of generic medicines scale. Journal of Medical Marketing, 14(1), 32-40.

Wouters, O. J., & Kanavos, P. G. (2015). Transitioning to a national health system in cyprus: A stakeholder analysis of pharmaceutical policy reform. Bulletin of the World Health Organization, 93(9), 606-613. doi:10.2471/BLT.14.148742

World Trade Organization [WTO]. (2001). Ministerial declaration WT/MIN(01)/DEC/1, adopted on 14 November 2001. Declaration on the TRIPS agreement and public health. World Trade Organization. Available from: https://www.wto.org/english/thewto_e/minist_e/min01_e/mindecl_trips_e.htm

Yadav P, Curtis K & Sekhri N. (2006). Mapping and realigning incentives in the global health supply chain. Risk and incentive study of global health supply chains. Global Health Forecasting Working Group Background Paper. Washington DC: Centre for Global Development. Available at http://www.zlc.edu.es/content/files/RealigningIncentives.pdf.

Yang, B. M., Prescott, N., & Bae, E. Y. (2001). The impact of economic crisis on health-care consumption in Korea. Health Policy and Planning, 16(4), 372-385.

Zavras, D., Tsiantou, V., Pavi, E., Mylona, K., & Kyriopoulos, J. (2012). Impact of economic crisis and other demographic and socio-economic factors on self-rated health in Greece. The European Journal of Public Health, 23(2), 206-210.

Appendices

Appendix (I): Definition of Key Terms and Concepts

In order to ensure a common understanding of the key terms, concepts and terminology, the following definitions should be considered for the purpose of this research:

Acute Disease/ Acute Indication

"(1) Any illness that develops quickly, is intense or severe and lasts a relatively short period of time. (2) Any condition—e.g., infection, trauma, fracture—with a short (often less than 1 month) clinical course. Acute illnesses usually respond to therapy; a return to a state of complete—pre-morbid—health is the norm." (Mosby's Medical Dictionary, 2009)

Adverse Drug Reaction (ADR):

"Any unintended effect of a pharmaceutical product occurring at normal dosage which is related to the pharmacological properties of the drug. Adverse events can range from mild to severe. Also known as 'side effect.'" (Global Pharmacovigilance, n.d.)

Attitude:

"The tendency to respond positively or negatively towards a certain idea, object, person, or situation. Attitude influences an individual's choice of action, and responses to stimuli (challenges, incentives, and rewards)." (Business Dictionary, n.d.). For the purposed of this research Attitude is "the willingness of a respondent to use a generic medicine, the factors and conditions that might affect this willingness."

Chronic Disease:

"Any disorder that persists over a long period and affects physical, emotional, intellectual, vocational, social, or spiritual functioning." (Mosby's Medical Dictionary, 2009)

Effectiveness/ Efficacy:

Effectiveness: is the extent to which an intervention does more good than harm when provided under the usual circumstances of health care practice.
Efficacy: is the extent to which an intervention does more good than harm under ideal circumstances. (PHIS, n.d.). "The medicine should be shown to be effective for the indication claimed." (MSH, 2012)

Generic Medicine:

* "A pharmaceutical product usually intended to be interchangeable with the originator brand product, manufactured without a license from the originator manufacturer and marketed after the expiry of patent or other exclusivity rights. They are also quite frequently marketed under brand (Trade) names, often called "branded generics". Many different branded generic products of the same medicine can be on the market in a country along with the originator brand product." (WHO, 2004)
* "A pharmaceutical product which has the same qualitative and quantitative composition in active substances and the same pharmaceutical form as the reference medicinal product, and whose bioequivalence with the reference medicinal product has been demonstrated by appropriate bioavailability studies." (PHIS, n.d.)
* "A generic medicine is a drug product that is bioequivalent to a brand or reference listed drug product in terms of dosage form, strength, route of administration, quality, safety, performance characteristics, and intended use." (US FDA, n. d.)
* "A generic medicine as a medicine that is developed to be the same as a medicine that has already been authorized. A generic medicine contains the same active substance(s) as the reference medicine, and it is used at the same dose(s) to treat the same disease (s) as the reference medicine. However, the name of the medicine, its appearance, and its packaging can be different from those of the reference medicine" (EMA, 2012)

Generic Prescription (GP):

"The prescribing of a drug by a physician using the generic name. This leaves the choice of brand to the dispensing pharmacist." (Roberts et al., 1987)

Generic Substitution (GS):

* "A pharmacist-initiated act by which a different brand or an unbranded drug product is dispensed instead of a drug brand that was prescribed by the physician. This means substituting the same chemical entity in the same dosage form for one marketed by a different company" (Roberts et al., 1987)
* "The process in which the pharmacists are required/ or allowed for substituting a brand medicine with its therapeutic equivalent generic version, unless prohibited by the prescriber."
It may be *mandatory*, where pharmacist are required to substitute the brand medicines; or *indicative*, where pharmacists are allowed to substitute the brand medicines (Hassali et al., 2014)

Innovator brand:

See Originator Brand / Originator Pharmaceutical Product (WHO/HAI, 2008)

Inspection:

* A regulatory inspection is an officially conducted examination (i.e. review of quality assurance processes, personnel involved, any delegation of authority and audit) by relevant authorities at sites where pharmaceutical activities take place (i.e. manufacturing, wholesale, testing, distribution, clinical trials) to verify adherence to Good Practices. (WHO, 2014)

Knowledge (of generic medicines)

Understanding the concept and the technical definition of generic medicines—a medicine that contains the same active ingredient(s) (API) and the same concentration (amount) as the original brand, but may contain different excipients leading to different color and flavor; generics are marketed under a different trade name by a different company); generic medicines are therapeutically and clinically interchangeable, and with the same efficacy, safety, and quality as the original brand—was explored and reported in many studies, across several countries. (Alrasheedy et al., 2014)

Licensing

"National legal provisions on who should manufacture, import or supply pharmaceuticals products, what qualifications people in the supplying agency should have, and who should dispense and sell pharmaceutical products." (WHO, 2014)

Marketing Authorization (Registration)

"A legal document issued by the competent drug regulatory authority for the purpose of marketing or free distribution of a product after evaluation for safety, efficacy and quality. It must set out, inter alia, the name of the product, the pharmaceutical dosage form, the quantitative formula (including excipients) per unit dose, the shelf-life and storage conditions, and packaging characteristics. It specifies the information on which authorization is based (e.g. "The product(s) must conform to all the details provided in your application and as modified in subsequent correspondence"). It also contains the product information approved for health professionals and the public, the sales category, the name and address of the holder of the authorization, and the period of validity of the authorization. Once a product has been given marketing authorization, it is included on a list of authorized products – the register – and is often said to be "registered" or to "have registration". Market authorization may occasionally also be referred to as a 'license' or 'product license.'" (WHO, 2007)

Medicine Promotions:

"Information about medicines designed to inform patients and health professionals about the medicinal products; it could be in different forms such as product labeling, package insert — patient information leaflet, journals, review articles, bibliographic indexes and other published materials, reference books, textbooks, formularies, standard treatment guidelines, medicine compendia, medicine bulletins, manufacturers' promotion materials, On line advertising. Regulating medicine information and promotion is therefore necessary to prevent the dissemination of inaccurate and misleading information and ensure access to unbiased, truthful medicine information to enhance appropriate use of medicines by healthcare providers and patients." (WHO, 2009a)

Medicine Registration (Market Authorization or Product Licensing)

"The procedures to evaluate safety, efficacy and quality of the pharmaceutical products before authorizing it to enter the market; only medicines that pass through this step successfully are allowed to enter the market." (WHO, 2009a)

National Medicines Regulatory Authority/ National Drug Authority (NMRAs, NRAs):

"A national body that has the legal mandate to set objectives and administer the full spectrum of medicines regulatory activities, including at least all of the following functions in conformity with national drug legislation: Marketing authorization of new products and variation of existing products; Quality control laboratory testing; Adverse drug reaction monitoring; Provision of medicine information and promotion of rational medicines use; Good Manufacturing Practice (GMP) inspections and licensing of manufacturers, wholesalers and distribution channels; Enforcement operations."(WHO, 2014)

Non-Communicable Diseases (NCDs)

"A wide group of medical conditions, or diseases that are, by definition, non-infectious and non-transmissible among people. They are, also, known as chronic diseases; and tend to be of long duration. The main types of NCDs are cardiovascular diseases (like heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma) and diabetes." (WHO, 2018b)

Originator Brand / Originator Pharmaceutical Product

"The product that was first authorized worldwide for marketing (normally as a patented product) on the basis of the documentation of its efficacy, safety and quality, according to requirements at the time of authorization." (WHO/HAI, 2008)

Out-of-Pocket (OOP)

"The direct payments made by individuals to health care providers at the time of service use." (WHO, n.d.)

Over-The-Counter Medicine (OTC) (Non-Prescription Medicine)

"Medicines that can be sold from licensed dealers (pharmacists) without professional supervision and without prescription. These medicines are suitable for self- medication for minor disease and symptoms." (WHO, 2014)

Perception:

"The way in which something is regarded, understood, or interpreted" (Merriam Webster, n.d.). For the purposed of this research Perception is the "the views and opinions expressed from the respondent concerning the effectiveness, safety, quality, and cost of the generic medicines"

Pharmaceutical Policy:

"The principles guiding decision making in the field of pharmaceuticals. Its goal is to contribute to the overall health, welfare, and well-being of the society. It includes any policy that attempts to improve or regulate registration, reimbursement, and distribution of pharmaceuticals" (Almarsdóttir & Traulsen, 2006e, p.7)

Pharmaceutical Sector:

"The various actors involved in the area, namely the government, private for profit organizations, private not for profit organizations, etc., engaged in the research, manufacture, import, export, distribution, retail, etc. of medicines." (WHO, 2009)

Pharmacovigilance:

"The science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other drug-related problems." (WHO, 2002).
"The process and science of monitoring the safety of medicines and taking action to reduce risks and increase benefits from medicines." (PHIS, 2009)

Prescription-only Medicines

"Medicines are medicines supplied only in licensed pharmacies on the presentation of signed prescriptions issued by a licensed and registered medical practitioner, licensed and/or registered dentist (for dental treatment only), and/or licensed and/or registered veterinarian (for animal treatment only), and the supply and dispensing of these medicines must be carried out by a pharmacist or under the supervision of a pharmacist. Prescription-only medicines are further subdivided into controlled medicines (narcotic medicines and psychotropic substances) and non-controlled medicines." (WHO, 2014)

Quality Assurance (QA)

"A wide-ranging concept covering all matters that individually or collectively influence the quality of a product. It is the totality of the arrangements made with the object of ensuring that pharmaceutical products are of the quality required for their intended use." (PHIS, n.d.)

Quality Control (QC)

"All measures taken, including the setting of specifications, sampling, testing and analytical clearance, to ensure that starting materials, intermediates, packaging materials and finished pharmaceutical products conform with established specifications for identity, strength, purity and other characteristics." (PHIS, n.d.)

Quality (of Medicinal Product)

"The medicine should be well made, as specified in the official pharmacopoeia, the product's manufacturing should comply with the quality documentation submitted by the applicant that demonstrates its safety and efficacy" (MSH, 2012)

Safety (of Medicinal Product)

"The extent to which the medicine produces unintended effects at the normal dosage; known as side effects or adverse drug reactions, ADR" (Global Pharmacovigilance, n.d.)
"The medicine should not present risks that are disproportionate to its benefits." (MSH, 2012)

Side Effects

See Adverse Drug Reaction (ADR) (Global Pharmacovigilance, n.d.)

Appendix (II): Literature Review Structure, and the Main Resources Reviewed

Topic (Area)		Reviewed Literature	Relevance and Criticism	
Theme	**Sub-Theme**	**Key Scholars**	**Main Taking(s)**	**Limitations**
The Impact of Economic Downturns on Health, Health care and Pharmaceuticals	**Impact on Health & Healthcare**	Musgrow (1987), Wibulpolprasert, Tangcharoensathien & Lertiendumrong (1998), Yang, Prescott & Bae (2001), Waters, Saadah & Pradhan (2003), Zavras, Tsiantou, Pavi, Mylona, & Kyriopoulos (2012), Simou & Koutsogeorgou (2014), Leopold et al. (2014)	Economic recessions have a detrimental effect on the health of the population because economic downturns are strongly associated with reduced income, budgetary constrains to spend on health, increased number of uninsured citizens, and, consequently, increased out-of-pocket spending. All these factors combined lead to lowered access to health care, with serious equity concerns, and deterioration of the health status of the population	
	Impact on Medicines Availability, Consumption, and Price	Yang, Prescott & Bae (2001), Suryawati, Ross-Degnan, Slamet, Nurita & Hogerzeil (2004) and Buysse, Laing & Mantel (2010), Phuong et al. (2019)	* Little change in the availability of 12 indicator medicines (Asian 1997 Crisis) * a general price increase was seen during or after the recession * The decline in the GDP led to a decline in the pharmaceutical consumption	* The pharmaceutical consumption, both cases (Asian 1997 crisis & Glob 2008 recession), was assessed at the aggregated country level, which disregard the serious equity concerns and give a rosier picture compared to the analysis subdivided by income categories * Pharmaceutical sales may also be influenced by other market variables such as patent expiration, presence o absence of local industry and generic competitions.

Topic (Area)		Reviewed Literature	Relevance and Criticism	
Theme	**Sub-Theme**	**Key Scholars**	**Main Taking(s)**	**Limitations**
Implemented Pharmaceutical Policies During and After Economic Downturns:	**The efforts, implemented by the Indonesian Ministry of Health, to maintain the availability and affordability of pharmaceuticals during the 1997-1998 Asian economic crisis**	Suryawati et al. (2004) and Buysse, Laing & Mantel (2010)	Four Key Measures; (1) establishment of a monitoring system, (2) provision of a national buffer stock of essential medicines, (3) the additional subsidy to cover the excess of exchange rate for pharmaceutical manufacturing, and (4) efficient use of international donations.	The study looked at only 12 different medicines in Indonesia, and "while the medicines prices hardly increased during the]Asian crisis[, they did so after the crisis by 25-50%
	The different pharmaceutical policies implemented, by the different countries, in response to the global economic crisis of 2008-2009	Buysse, Laing & Mantel (2010) , Vogler et al. (2011), Leopold et al. (2014), Behmane & Innus (2011), Rüütel & Pudersell (2011), Vandoros & Stargardt (2013), Petrou & Vandoros (2015) and Wouters & Kanavos (2015)	the main implemented pharmaceutical policies after economic downturns pertain to three main domains; (a) pricing related policies: price cuts, distribution remuneration and mark-up regulation, taxes on medicines and extra-ordinary price reviews, (b) cost containment and reimbursement policies: budget cuts, out-of-pocket payment, delisting, and (c) generic medicines policies: generic substitution, public awareness campaigns and other generic policies.	The studies cannot be considere as conclusive and the discussed implemented policies should be considered by other countries in the light of two facts. The first, is that th majority of the population, in the stu countries, especially the western European countries, was covered by social security system or national health service. The second is that it was not always clear whether a coun implemented a policy as a short-term reaction to recession-related budgeta constraints or whether the policy was part of a planned long-term change t the system.

Topic (Area)			Reviewed Literature	Relevance and Criticism	
Theme	Sub-Theme		Key Scholars	Main Taking(s)	Limitations
	Promoting Generic Medicines's Use; an effective policy intervention, especially during and after economic downturns		Cameron et al. (2009 & 2012); Godman et al. (2010a & 2010b); Vogler et al. (2011); King & Kanavos (2012); Hassali et al. (2014); Leopold et al. (2014); Vogler et al. (2016)	Promoting generic medicines is considered as a leverage of change during economic recessions. During the years from 2010 to 2015, a number of generic promotion measures (33 measure) were enforced in the European countries	
Promoting the Use of Generic Medicines	**Generic Medicines**	**What is a Generic**	WHO (2004); US FDA (n. d.); EMA (2012)	* a generic medicine is a pharmaceutical product, usually intended to be interchangeable with an innovator product * Both innovator (originator) and generic medicines have the same active ingredients (APIs), strength, pharmaceutical form, and route of administration; they might be different in shape, color, taste (flavor), and packaging	
		____Quality	Chow (2014); US FDA (2018); MSH (2012)	Generic medicines are granted a market access after a rigorous process of proving their therapeutic and safety equivalence with the originator medicine (via the bioequivalence and chemical data)	

Topic (Area)			Reviewed Literature	Relevance and Criticism	
Theme	Sub-Theme		Key Scholars	Main Taking(s)	Limitations
		_____Cost	Shafie & Hassali (2008); Cameron et al. (2009); Coombes (2009); Cameron et al. (2012); Hassali et al. (2014); Rana & Roy (2015); Generic Pharmaceutical Association (2017)	* Generic medicines are 20–90% cheaper than their counterpart innovator brands * the prices of the lowest cost generic medicines were on average 2.6 times less expensive than the corresponding originator medicines * Numerous studies have investigated and estimated the realized financial savings from using generic medicines; and their key role in lowering the prices of the off-patent innovator medicines and other generic equivalents "an average of 9% to 89% could be saved by an individual country from a switch in private sector purchases from originator brands to lowest-priced generics."	The evidence of savings was mainly Europe and USA; while in LMIC the literature provided a hypothetical estimates
		____Impact	Cameron et al. (2009); King & Kanavos (2002); Rana & Roy (2015);	Such key features of generic medicines; comparable quality and lower cost, have significantly resulted in: * a **cost-effective, improved access, and, hence, affordability, to medications**, both for governments and individuals who have to pay out of pocket for medicines * achieving **a comprehensive and sustainable healthcare system**	

Topic (Area)		Reviewed Literature	Relevance and Criticism	
Theme	**Sub-Theme**	**Key Scholars**	**Main Taking(s)**	**Limitations**
	_____Use	Sheppard (2011); Rana & Roy (2015); imarc (2018)	* The use of generic medicines has been increasing all over the world. * Generic medicines have become "the 'gold standard' and 'first-line therapy' for many acute and chronic diseases"	
	Policies and Strategies Implemented to Promote Generics' Use in Different Countries	Garattini & Tediosi (2000); King & Kanavos (2002); Gibson et al. (2005); Kaplanet al. (2012); Babar et al. (2014); Hassali et al. (2009 & 2014); Moe-Byrne et al. (2014)	There is **a wide range of policies that have been or can be employed to promote generics' use and enable their aspired health and financial impacts** * Supply-side measures relate to market entry and penetration of generic medicines, as well as issues around pharmaceutical pricing, reimbursements, determining pharmaceuticals available in a reimbursement (positive) list, and Intellectual Property Rights (IPR) issues. * Demand-side measures are associated mostly with interventions at prescribing and dispensing levels and purchasing by consumers (patients).	The literature on the impact of pro-generic medicine pharmaceutical policies and its impact in LMICs wa much less systematized and mostly descriptive. It is critical to take into account the local conditions in order guarantee acceptance and ensure performance

Topic (Area)		Reviewed Literature	Relevance and Criticism	
Theme	**Sub-Theme**	**Key Scholars**	**Main Taking(s)**	**Limitations**
	Barriers to the Implementation of Pro-Generic Medicines' Policies	Yadav et al. (2006); Waber et al. (2008); Kaplan et al. (2012); Hassali et al. (2014); Kaplan & Wirtz (2014); Toverud et al. (2015);	The main barriers facing pro-generic medicines policies are, primarily: ***legal and regulatory barriers;** regulatory and intellectual property policies, pricing, purchasing and dispensing regulations which disincentives providing generic medicines. ***institutional and managerial;** low availability of generics, poorly managed generic advocacy programs, lack of monitoring and evaluation programs, and informational asymmetry ***financial barriers;** 'misaligned' stakeholders' behaviors along the pharmaceutical value chain ***behavioral and perceptual barriers;** the perception and knowledge regarding generic medicines	
	Recommendations to Improve Generic Medicines' Use:	Ensor & Cooper (2004); Simoens & De Coster (2006); Godman et al. (2010b); Sheppard A. (2011); Faden, et al. (2011); Kaplan et al. (2012); Dylst et al. (2013); Chambers et al. (2014); Babar et al. (2014)	* Target the physicians, pharmacists, and patients using financial incentives together with educational intervention and audit/feedback. * (1) A trusted medicine regulatory authority (MRA/ NRA), (2) a robust market for generics; and (3) the alignment of the pro-generic medicine incentives of prescribers, dispensers and patients as well.	

Topic (Area)		Reviewed Literature	Relevance and Criticism	
Theme	**Sub-Theme**	**Key Scholars**	**Main Taking(s)**	**Limitations**
Knowledge, Perceptions, and Attitudes towards Generic Medicines: (Patients)* **	**Understanding the term 'Generic Medicine'**	Hassali, Kong & Stewart (2005); Gossell-Williams & Harriott (2007); Al-Gedadi, Hassali & Shafie (2008); Babar et al. (2010); Kobayashi et al. (2011); Sharrad & Hassali (2011); Al Ameri et al. (2011); Quintal & Mendes (2012)	* the term ‘generic medicine’ is not commonly used, nor familiar to patients and medicine consumers * High familiarity with the term 'generic medicine,' which was not, necessarily, mean having a correct understanding of the concept of generic medicines	The studies have generalizabilit claims as samples were mainly drive from certain cities in each country.
	Understanding the concept of 'Generic Medicine'	Hoshi & Kimura (2008); Thomas & Vitry (2009); Babar et al. (2010); Kobayashi et al. (2011); Sharrad & Hassali (2011); Toverud, Røise, Hogstad & Wabø (2011); Lebanova, Manolov & Getov (2012)	* A lack of knowledge of the concept and techinical definition of generic medicine among high percentage of participants in many countries, including: Australia, Malaysia, Japan, Iraq, Norway and Bulgaria * A higher knowledge and awareness levels among participants in the UK and Portugal.	
	Preference and Perceptions of Generic Medicines	Sansgiry, Bhosle & Pope (2005); Bertoldi, Barros & Hallal (2005); Hoshi & Kimura (2008); Shrank et al. (2009); Keenum, DeVoe, Chisolm & Wallace (2012); Lebanova et al. (2012); Ibrahim, McKinnon & Ngo (2012); Sewell et al. (2012)	* Despite knowledge, people might have different opinions about generic medicines. * Medicine consumers prefer original brand medicines rather than generic versions	

Topic (Area)		Reviewed Literature	Relevance and Criticism	
Theme	**Sub-Theme**	**Key Scholars**	**Main Taking(s)**	**Limitations**
		Al-Gedadi et al. (2008); Shrank et al. (2009); Sewell et al. (2012); Sicras-Mainar & Navarro-Artieda (2012); Lebanova et al. (2012); Keenum et al. (2012); Dunne & Dunne (2015); Kesselheim et al. (2016)	* Negative perceptions and misconceptions about generic medicines were reported widely among medicine consumers and patients in many countries, including: USA, Spain, Malysia, and Bulgaria * Patient confidence and knowledge pertaining to generic medicines use have increased over the past four decades, especially in developed countries	
	Factors Affecting the Acceptance of Generic Medicines; and the Decision to Use them:	Ganther & Kreling (2000); Gaither at al. (2001); Al-Gedadi et al. (2008); Figueiras et al. (2008 & 2009); Hassali et al. (2009); Denoth at al. (2011); Al Ameri et al. (2011); Sewell et al. (2012); Keenum et al. (2012)	The severity of the medical condition was reported as being a factor influencing the choice to use generic medicines, where consumers were more willing to use generic medicines for mild conditions but were less likely to use them for more serious diseases	* The studies have generalizability claims as samples were mainly drive from certain cities in each country. * The literature pertaining to LMIC was scarce
		Sicras-Mainar & Navarro-Artieda (2012); Babar et al. (2010); Al-Gedadi et al. (2008); Heikkilä et al. (2007); Kjoenniksen, Lindbaek & Granas (2006); Kobayashi et al. (2011b)	* Both physicians and pharmacists play an essential role in the promotion of generic medicines and patients' acceptance of their use and generic substitution * Physicians have a relatively more influential role than pharmacists in convincing patients to use generic medicines.	

Appendix (III): The Questionnaire Used in the Study

Part One	Participant Demographic Profile بيانات عامة (ديموغرافية) عن المشارك	الجـــزء الأول

1.1	Sex النوع	
1	Male	ذكر
2	Female	انثى

1.2	Age العمر

1.3	Marital Status الحالة الاجتماعية / الزواجية	
1	Married	متزوج
2	Not Married	غير متزوج

1.4	Level of Education (Highest Qualification) المستوي التعليمي (أعلى مؤهل):	
1	No Education	لم يسبق الذهاب الى المدرسة
2	Primary Complete/ Some Secondary	إتمام المرحلة الإبتدائية/ بعض الثانوى
3	Secondary Complete/ Diplome	إتمام المرحلة الثانوى/ دبلوم
4	University Degree	الحصول على درجة جامعية
5	Post-graduate Degree	دراسات عليا (ماجيستير، دكتوراه...)

1.5	Type of Residence نوع محل الإقامة	
1	Urban	منطقة حضرية (مدينة)
2	Rural	منطقة ريفية (قرية)

Page (1) of (11)

1.6	Residence (Governorates) محل الإقامة (المحافظة)	
1	Cairo	القاهرة
2	Alexandira	الإسكندرية
3	Port Said	بورسعيد
4	Suez	السويس
5	Damietta	دمياط
6	Dakahlia	الدقهلية
7	Sharkia	الشرقية
8	Kalyubia	القليوبية
9	Kafr El-Sheikh	كفر الشيخ
10	Gharbia	الغربية
11	Menoufia	المنوفية
12	Behera	البحيرة
13	Ismailia	الإسماعيلية
14	Giza	الجيزة
15	Beni Suef	بني سويف
16	Fayoum	الفيوم
17	Menya	المنيا
18	Assuit	أسيوط
19	Sohag	سوهاج
20	Qena	قنا
21	Aswan	أسوان
22	Luxor	الأقصر
23	Red Sea	البحر الأحمر
24	New Valley	الوأدى الجديد
25	Matroh	مطروح

1.7	Work Status الحالة العملية	
1	Working for Cash	يوجد عمل والحصول على عائد نقدى
2	Not Working for Cash	لا يوجد عمل / لا يتم الحصول على عائد نقدى

1.8	Profession المهنة / الوظيفة	
1	Not Working	لا أعمل
2	Medical Field	المجال الطبي
3	Physician	طبيب
3	Pharmacist	صيدلي
3	Other	مجالات أخري

1.9	Average Monthly Income متوسط الدخل الشهري	
1	Under EGP 1,500	أقل من ١,٥٠٠ جنيه مصري
2	Between EGP 1,500 and EGP 3,000	أكثر من ١,٥٠٠ وأقل من ٣,٠٠٠ جنيه مصري
3	Between EGP 3,000 and EGP 10,000	أكثر من ٣,٠٠٠ وأقل من ١٠,٠٠٠ جنيه مصري
4	Between EGP 10,000 and EGP 20,000	أكثر من ١٠,٠٠٠ وأقل من ٢٠,٠٠٠ جنيه مصري
5	More than EGP 20,000	أكثر من ٢٠,٠٠٠ جنيه مصري
6	I do not like to answer	لا أرغب فى الإجابة

Part Two	Health Profile and Spending on Medicines بيانات عن الصحة العامة والإنفاق على الأدوية	الجـــزء الثانى

2.1 Are you covered by any insurance (public, private, work-related, etc)?
هل لديك تأمين صحي (حكومي، خاص، تابع للعمل، الخ)؟

1	Yes, Completely	نعم, بشكل كامل
2	Yes, Partially	نعم, بشكل جزئي
3	Yes, but Not utilized	نعم, ولكني لا أستخدمه
4	No	لا

2.2 The cost of your medicines is covered by insurance, or paid out-of-pocket?
تكاليف (الإنفاق) علي الدواء مغطاة من خلال التأمين الصحي، أم من نفقاتك الشخصية؟

1	My **insurance** covers almost my main medicines' costs	التأمين الصحي يقوم بتغطية معظم تكاليف الأدوية
2	I pay for the medicines **out-of-pocket**	أقوم بدفع تكاليف الدواء من جيبي الخاص
3	**Both** (Insurance and Out-of-Pocket)	كليهما (التأمين الصحي والنفقات الشخصية)

2.3 Out of pocket spending on health (monthly average)*
متوسط الانفاق الشهري علي الصحة (الأدوية)

جنيه مصري

2.4 Average Number of Visits to Pharmacy (Community or Hospital Pharmacy)
متوسط عدد مرات الذهاب الى صيدلية (صيدلية عامة أو صيدلية مستشفي)

1	Once a week	مرة أسبوعياً
2	Once a month	مرة شهرياً
3	Once every 3 months	مرة كل ثلاثة أشهر
4	Once every 6 months or less	مرة كل ستة أشهر
5	Not Regular / When Needed	بصورة غير منتظمة / عند الحاجة

2.5 Regular use of Medicines for Chronic Diseases (diabetes, hypertension, cholestrol…)
تناول بعض الأدوية بانتظام لعلاج أمراض المزمنة (مثل السكر، الضغط، الكلويسترول، .....)

1	No	لا
2	Yes	نعم

What Chronic Diseased you Suffer from? ما هي الأمراض المزمنة التي تعاني منها؟

Part Three	Originator (Innovator) Brand-name versus Generic Medicine الدواء الأصيل والدواء الجنيـــس	الجـــزء الثالث

Please Answer the following questions based on your information and knowledge of medicines

بالرجاء الإجابة على الأسئلة التالية بناءاً على معلوماتك ومعرفتك عن الأدوية وأنواعها

3.1 Are you familiar with the term **"Generic Medicine"**

هل كلمة/مصطلح **"دواء جنيس/مماثل"** مألوفة أو معروفة بالنسبة لك؟

1	Yes	نعم
2	No	لا
3	Not Sure	لست متأكد

3.2 What is a **"Generic Medicine"**?

ما هو **"الدواء الجنيس/ المماثل"؟**

1. A generic medicine is the .....

الدواء الجنيس هو .....

1	Similar	المثيل
2	Substitute	البديل
3	Both	كليهما
4	I Do not Know	لا أعرف

2. A generic medicine is another brand name for the same drug (active substance)

الدواء الجنيس هو اسم تجاري آخر لنفس الدواء (المادة الفعالة)

1	TRUE	صحيح
2	FALSE	خطأ
3	I Do not Know	لا أعرف

3. A generic medicine is cheaper than originator (innovator) branded medicine

الدواء الجنيس أقل ثمناً من الدواء الأصيل

1	TRUE	صحيح
2	FALSE	خطأ
3	I Do not Know	لا أعرف

4. For each medicine (active ingredient); there are many originator (innovator) branded medicines, while there is only one generic medicine

لكل تركيبة دوائية (مادة فعالة)؛ يوجد العديد من المستحضرات الأصيلة، ويوجد مستحضر جنيس واحد فقط

1	TRUE	صحيح
2	FALSE	خطأ
3	I Do not Know	لا أعرف

5. The generic medicine is the locally manufactured medicine (local Egyptian medicine); while the originator (innovator) branded medicine is the imported one (imported medicine)

الدواء الجنيس هو دواء يتم تصنيعه محلياً (دواء مصري)؛ بينما الدواء الأصيل هو دواء يتم استيراده من الخارج (دواء مستورد)

1	TRUE	صحيح
2	FALSE	خطأ
3	I Do not Know	لا أعرف

6	A generic medicine can be marketed under different brand names, for a number of pharmaceutical companies الدواء الجنيس يتم تسويقه بأسماء تجارية مختلفة لعدد من شركات الأدوية	
1	TRUE	صحيح
2	FALSE	خطأ
3	I Do not Know	لا أعرف
7	Both the originator (innovator) branded medicine and the generic medicine have the same active substance, pharmaceutical form, concentration, and indication كلٍ من الدواء الأصيل والدواء الجنيس له نفس المادة الفعالة، الشكل الصيدلاني، التركيز، وداعي الإستعمال	
1	TRUE	صحيح
2	FALSE	خطأ
3	I Do not Know	لا أعرف
8	Both the originator (innovator) branded medicine and the generic medicine have the same effectiveness and safety كلٍ من الدواء الأصيل والدواء الجنيس له نفس التأثير العلاجي والفاعلية، والمأمونية (درجة الأمان)	
1	TRUE	صحيح
2	FALSE	خطأ
3	I Do not Know	لا أعرف
9	Generic medicines and originator (innovator) branded medicine have different box (package), flavor and color تختلف الأدوية الجنيسة عن الدواء الأصيل في عبوة الدواء، الطعم (النكهة)، واللون	
1	TRUE	صحيح
2	FALSE	خطأ
3	I Do not Know	لا أعرف

3.3	You learnt about generic medicines from: ** you can choose more than one item مصدر معلوماتك عن الأدوية الجنيسة هو ** يمكن اختيار أكثر من مصدر		
1	Physician	الطبيب / الدكتور المعالج	
2	Pharmacist	الصيدلي	
3	Other healthcare provider (nurse, etc.)	مقدم الرعاية الصحية (ممرضة، ...الخ)	
4	Mass media; TV, Radia…etc	وسائل الإعلام (التلفزيون، الراديو، الخ)	
5	Reading matericals, newspaper, magazines, etc	المواد المقرونة (مجلات ، صحف الخ)	
6	Family and Friends	العائلة والأصدقاء	
7	Internet	الإنترنت	
8	None	ليس هناك مصدر	
9	Others	مصادر أخري	
	Such as:	مثل:	

Please Read "What is a Generic Flyer", then continue

***** من فضلك إقرأ "ما هو الدواء الجنيس؟" ثم أكمل***


الـــدواء الجنيـــس (المثيل)
Generic Medicine
VS
الـــدواء الأصيل
Originator / Brand-name Medicine
بعد انتهاء فترة الحماية القانونية (١٧–٢٠ سنة) يسمح للشركات بتصنيع الدواء تحت أسماء تجارية مختلفة، وبأسعار أقل نظراً لعدم تحمل الشركة تكاليف البحث
Other companies are allowed to produce the medicine under different trade names, after the legal protection period (17 – 20 years). Usually have lower prices because the manufacturing company did not incur any research costs
الدواء الأصيل: هو دواء مبتكر، تخترعه شركة أدوية بعد بحث وتطوير يتكلف أموال كثيرة
Originator Medicine: it is the innovator medicine created by a drug company after a costly procedure of development and research
تحتفظ الشركة بحقوق تسويقية خلال فترة محددة (براءة اختراع)
The company holds the marketing rights for a specific period (patent)
R
الـــدواء الجنيس (المثيل) والدواء الأصيل متكافئان
Generic medicine and Originator 'Branded' medicine are equivalent
Active Substance (scientific name)
المادة الفعالة (الاسم العلمى)
Pharmaceutical Form (capsule, syrup, pill)
الشكل الصيدلي (كبسولة، شراب، قرص)
Concentration
التركيز
Indication
دواعي الاستعمال
تكافؤ صيدلاني
Pharmaceutical Equivalence
Drug Performance inside the body
أداء الدواء داخل الجسم
Effectiveness
التأثير العلاجي والفعالية
Safety
المأمـونية
تكافؤ حيـوي
Vital Equivalence
وقد يختلف الدواء الجنيس عن الأصيل في:
Generic medicine could differ from Originator 'Branded' medicine in:
Price السـعر
Flavor المنكـهات
Color اللـون

مثـــــال لـــدواء أصيل وأدويته الجنيسة في السوق المصري

Example of Originator Medicine and its Generics in the Egyptian Market

الـــدواء الجنيس (المثيل)
Generic medicine

الـــدواء الأصيل
Innovator/ Brand-name

[1]

** الشركة التي قامت باكتشاف وتصنيع الدواء الأصلي كانت أول شركة تقوم بذلك؛ وعليه، قامت بتسميته (**أوجمنتين**)، وبعد عدد من السنوات (بعد انتهاء فترة حماية الملكية الفكرية)، بدأت شركات الأدوية الأخرى (سواء محلية أو مستوردة) في تصنيع وتداول أدوية جنيسة مماثلة تماماً تحت أسماء تجارية أخري (**كيورام، ماجنابيوتك، هايبيوتك، ايموكسكلاف، . . .**)

** The company that manufactured the original medicine was the first to do so, they gave it the brand name (**Augmentin**), after number of years when the patent expired, other pharmaceutical companies started to manufacture and market the generics under different trade names (**Curam, Magnabiotic, Hi-biotic, E-moxclav**, . . .)

[1] المثال الموضح الهدف منه هو التوضيح، ولا يعتبر مواد دعائية
The example shown is for illustration purposes, and should not be considered as a marketing material

3.4	Have you ever used a generic medicine? هل سبق وقمت باستخدام دواء جنيس/ مثيل؟	
1	Yes	نعم
2	No	لا
3	May be / Not Sure	ربما / لست متأكد

3.5	Do you think public (medicine users) need to get more awareness and information about generic medicines هل تعتقد أن الجمهور (مستخدمي الأدوية) بحاجة لمزيد من التوعية والمعلومات عن الأدوية الجنيسة؟	
1	Yes	نعم
2	No	لا

3.6 Despite Knowledge, People have different opinions about generic medicines. The following statements assess some of these opinions. Please indicate how much you agree or disagree with the following statements, by choosing the appropriate number

على الرغم من المعرفة، الناس لديهم آراء وانطباعات مختلفة حول الأدوية الجنيسة؛ العبارات التالية تقييم لبعض هذه الآراء، يرجى الإشارة إلى مدى موافقتك أو عدم موافقتك على كل منها، وذلك عن طريق اختيار الرقم المناسب، لا يوجد إجابة صحيحة وأخرى خاطئة .... برجاء التعبير عن رأيك الشخصى

		Strongly Disagree **أعارض بشدة**	Disagree أعارض	More or Less Disagree أعارض بشكل ما	More or Less Agree أوافق بشكل ما	Agree أوافق	**Strongly Agree** **أوافق بشدة**
1	I believe that "Generic medicines take longer time to be effective" أعتقد أن "الأدوية الجنيسة (المثيلة) تستغرق وقت أطول لتصبح فعالة، وتعطي نتيجة علاجية"	**1**	2	3	4	5	**6**
2	I believe that "Generic medicines are good for less serious diseases" أعتقد أن "الأدوية الجنيسة (المثيلة) تعتبر جيدة لعلاج الأمراض البسيطة"	**1**	2	3	4	5	**6**
3	I believe that "Generic medicines are made with lower quality substances." أعتقد أنه "يتم تصنيع الأدوية الجنيسة (المثيلة) باستخدام مكونات أقل جودة"	**1**	2	3	4	5	**6**
4	I believe that "Generic medicines need higher doses to be efficacious/effective" اعتقد ان "الأدوية الجنيسة (المثيلة) تحتاج جرعات/ تركيزات اكبر لتصبح فعالة"	**1**	2	3	4	5	**6**
5	I believe that "Generic medicines have the same quality control as the originator branded medicine" أعتقد أن "الأدوية الجنيسة يتم التأكد من جودتها مثل الدواء الأصيل"	**1**	2	3	4	5	**6**
6	I believe that "Generic medicines have the same effect as the originator branded medicine" أعتقد أن "الأدوية الجنيسة لها نفس التأثير مثل الدواء الأصيل"	**1**	2	3	4	5	**6**
7	I believe that "Generic medicines are used for the same illnesses as the originator branded medicine" أعتقد أن "الأدوية الجنيسة تستخدم لعلاج نفس الأمراض مثل الدواء الأصيل"	**1**	2	3	4	5	**6**
8	I believe that "Generic medicines have the same safety to as the originator branded medicine" أعتقد أن "الأدوية الجنيسة (المثيلة) لها نفس مأمونية الإستخدام مثل الدواء الأصيل"	**1**	2	3	4	5	**6**
9	I believe that "Generic medicines are exactly the same as the originator branded medicine" أعتقد أن "الأدوية الجنيسة تماثل تماماً الدواء الأصيل"	**1**	2	3	4	5	**6**

10	"I would trust more the originator branded medicine than a generic medicine" أشعر بالثقة تجاه الدواء الأصيل أكثر من الأدوية الجنيسة/ المثيلة	**1**	2	3	4	5	**6**
11	I believe that "Generic medicines have more undesirable effects (side-effects) than originator (innovator) branded أعتقد أن " الأدوية الجنيسة (المثيلة) تتسبب في آثار جانبية أكثر من الدواء الأصيل"	**1**	2	3	4	5	**6**
12	"I would be worried if my medication was changed from originator branded medicine to generic medicine" أشعر بالقلق إذا تم تغيير دوائي من الدواء الأصيل الى الدواء الجنيس (المثيل)	**1**	2	3	4	5	**6**
13	I believe that "The production standards of both the generic medicines, and the originator branded medicine, are the same" أعتقد أن "معايير وإشتراطات تصنيع الأدوية الجنيسة (المثيلة) هي نفس معايير واشتراطات تصنيع الأدوية الأصيلة"	**1**	2	3	4	5	**6**
14	I believe that "Concerned health regulatory authorities are able to detect possible irregularities in the production of generic medicines أعتقد أن "هيئات الرقابة الصحية ذات الصلة قادرة علي كشف أي اختلافات في تصنيع الأدوية الجنيسة (المثيلة)"	**1**	2	3	4	5	**6**
15	I believe that "Concerned health regulatory authorities are able to detect, in time, and recall batches (produced quantities) of generic medicines with reduced effectiveness and/or safety أعتقد أن "هيئات الرقابة الصحية ذات الصلة قادرة علي كشف أي تشغيلات (كميات منتجة) من الأدوية الجنيسة (المثيلة) تكون فعاليتها أو مأمونيتها قليلة؛ وذلك في الوقت المحدد، وسحبها من السوق المصري"	**1**	2	3	4	5	**6**
16	I believe that "the use of generic medicines will reduce the total cost of therapy أعتقد أن "استخدام الأدوية الجنيسة (المثيلة) سوف يخفض من إجمالي تكاليف العلاج"	**1**	2	3	4	5	**6**
17	I believe that "Generic medicines are cheaper because they are less effective" أعتقد أن "الأدوية الجنيسة (المثيلة) أقل ثمناً مثل الدواء الأصيل لأنها أقل فاعلية"	**1**	2	3	4	5	**6**
18	I believe that "Substitution of originator (innovator) branded medicine with generic medicines can also be done by pharmacists" أعتقد أن "استبدال الدواء الأصيل بالأدوية الجنيسة (المثيلة) يمكن أيضاً أن يتم من خلال الصيدلي"	**1**	2	3	4	5	**6**

3.7	Given that generic medicines, ideally, have the same quality, effectivness, and safety as originator branded medicines, while being cheaper; if you were given a choice between a generic and an originator branded medicine for a treatment, which one would you choose? نظراً لأن الدواء الجنيس (المثيل) له نفس الفعالية والجودة والمأمونية مثل الدواء الأصيل، ويكون سعره أقل من الدواء الأصيل؛ إذا كنت من سيقوم بالإختيار، أي دواء ستختـــار؟ الدواء الجنيس أم الدواء الأصيل						
		Strongly Disagree **أعارض بشدة**	Disagree أعارض	More or Less Disagree أعارض بشكل ما	More or Less Agree أوافق بشكل ما	Agree أوافق	**Strongly Agree** **أوافق بشدة**
1	I will choose a Generic medicine, if it is significantly **Cheaper** than the originator (innovator) branded medicine ساقوم باختيار الدواء الجنيس (المثيل)، إذا كان اقل ثمنا بشكل كبير من الدواء الأصيل	**1**	2	3	4	5	**6**

2	I will choose a Generic medicine, if it was for **a minor condition** (common cold, allergy, headache) ساقوم باختيار الدواء الجنيس (المثيل)،، إذا كان لحالة مرضية بسيطة (دور بر د، صدا ع)	**1**	2	3	4	5	**6**
3	I will choose a Generic medicine, for **any condition** (minor or major) ساقوم باختيار الدواء الجنيس (المثيل) لأي مرض أعاني منه (حالة بسيطة او مستعصية)	**1**	2	3	4	5	**6**
4	I will choose a Generic medicine, if it was for **chronic conditions** (Hypertension, diabetes, etc) ساقوم باختيار الدواء الجنيس (المثيل)، إذا كان لحالة مرضية مزمنة (ضغط الدم المرتفع، السكر، الخ)	**1**	2	3	4	5	**6**
5	I will choose a Generic medicine, if it was **imported** ساقوم باختيار الدواء الجنيس (المثيل)، إذا كان الدواء مستورد	**1**	2	3	4	5	**6**
6	I will choose a Generic medicine, if advised from the **pharmacist** ساقوم باختيار الدواء الجنيس (المثيل)، إذا نصحني بذلك الصيدلي	**1**	2	3	4	5	**6**
7	I will choose a Generic medicine, if prescribe by a **physician** ساقوم باختيار الدواء الجنيس (المثيل)، إذا تم طلبه في روشتة الطبيب	**1**	2	3	4	5	**6**
8	I will always choose **the Originator (innovator) branded medicine** ساقوم باختيار الدواء الأصيل دائماً	**1**	2	3	4	5	**6**
9	I will choose he Originator (innovator) branded medicine if **price** difference with the generic with small ساقوم باختيار الدواء الأصيل إذا كان فرق السعر مع الدواء الجنيس (المثيل) فرقاً بسيطاً	**1**	2	3	4	5	**6**
10	I will choose the Originator (innovator) branded medicine if any **side effects** started to happen after using a medication ساقوم باختيار الدواء الأصيل إذا ظهرت أية آثار جانبية من إستخدام الدواء	**1**	2	3	4	5	**6**

3.8	Which factor has the highest impact on your preference, or decision, to use a Generic Medicine أي من العوامل التالية له أكبر تأثير على تفضيلك / قرارك باستخدام الدواء الجنيس	
1	Price	السعر / التكلفة
2	Medical Condition	الحالة المرضية (المستدعية للعلاج)
3	Manufacturing Status (Imported - Generic)	تصنيع الدواء (محلي - مستورد)
4	Pharmacist Advise	نصيحة الصيدلي
5	Physician Opinion	رأي الطبيب
6	Other	عوامل أخري
	. . . . .	

Appendix (IV): Studies Investigating Patients' Perceptions and Acceptance of Generic Medicines (Questionnaire—Based)

Study	Country	Population and Sample Size
Al-Gedadi, Hassali & Shafie (2008)	Malaysia	A total of **396** valid questionnaires were included in the study (convenience sample)
Hoshi & Kimura (2008)	Japan	**457** outpatients (a convenience sample)
Kobayashi, Satoh & Ueda (2011)	Japan	A total of **1,215** completed questionnaires were obtained (response rate 90.3%) General patients
Ahire et al. (2013)	India	**100** participants of science back ground and **100** participants from general (non-science) background
Ganther & Kreling (2000)	Wisconsin, USA	A total of **355** usable questionnaires were included in the study (response rate 71.4%) General patients and consumers
Shrank et al. (2009)	USA National Survey	**1,047** usable questionnaires (response rate 48%) Commercially insured patients
Toklu et al. (2012)	Turkey	The study included **101** patients
Albarraq (2013)	Saudi Arabia (KSA)	A total of **450** participants were included in the study; 17.1% were medical professionals
Sicras-Mainar & Navarro-Artieda (2012)	Spain	Out of 208 randomly selected patients, **203** agreed to be interviewed (response rate 97.6%)
Figueiras et al. (2009)	Portugal	The study included **1,125** participants for the general population of Portugal (response rate 88%)
Hensler et al. (2013)	Germany	Out of 2,000, **126** responded to the questionnaire (response rate 6.3%) but only 99 were complete questionnaires and the online survey yielded **125** valid responses
Babar et al. (2010)	New Zealand	A total of **441** consumers participated in the study (response rate 76%) General population

Appendix (V): The Profile of the Main Interviewed Participants

	Interviewee Position & Affiliation	Sector	Category	
1	Patient(s)	Private	Patient	* Has sever disease (Multiple Sclerosis), Female, 40 years
2				*A diabetic and hypertensive, non-educated patient, 55 years
3				*A patient suffering from a number of NCDs with heart complication (MI), Educated, Female, 67 years
4	An Ophthalmologist, Associate Professor, working both govern	Governmental and Private	Physician	45 years old, male
5	Internalist Specialist	Governmental and Private		40 years old, male
6	New Product Launch and Technical Transfer Manager	Private	Pharmaceutical Industry	Multinational company that specializes in Generic Medicines
7	The Chief Executive Officer (CEO)	Private		Private local company
8	Pharmacist	Private	Pharmacist	Community pharmacist, working at private small pharmacy, male, 48 years
9		Private		Branch manager pharmacist, one of the Chain Pharmacies, male
10		Public		Governmental pharmacist, female, 32 years old
11	A representative from the pharmaceutical sector, MOHP	Public	Policy Maker & Regulatory Authority	High Level official (policy maker) at the Pharmaceutical Sector
12	Senior (managerial level) representative from EDA	Public		Middle management level

Appendix (VI): The Used Interview Guide

Category	Guiding Questions	
Patient(s) and Consumer(s)	Have you ever purchased a generic medicine?	هل سبق وقمت بشراء واستخدام دواء جنيس
	What medical conditions were there when generic medicines used, how severe the case was?	ما هو المرض/ المشكلة الصحية التي كنت تعاني منها عند استخدامك للدواء الجنيس؟ الي اى مدي يمكن تصنيف درجة المرض
	How was your experience of using a generic medicine? Any unfavorable or bad experience from the use of generic medication. Discussion?	كيف كانت تجربتك مع استخدام الأدوية الجنيسة؟ هل كان هناك إي مشاكل آو عدم راحة . مناقشة ذلك
	Would you be more likely to purchase a generic medicine if prescribed from Physician, a Pharmacist, any healthcare provider?	هل ستقبل وتتقبل الدواء الجنيس في حالة ما تم تحديده بواسطة الطبيب> الصيدلي, الخ ...
	What possible interventions might enhance the acceptance and trustworthiness of generic medicines, in the Egyptian context.	ما هي الإجراءات التي يمكن ان ترفع ثقة المرضي في استخدام الأدوية الجنيسة
With Physicians and Pharmacists	What is your opinion regarding generic medicines and their comparability to brand medicines?	ما هو رأيك بخصوص الأدوية الجنيسة ومدي مكافئتها للأدوية الأصلية (فعالية, جودة، مأمونية، تكلفة ...
	Based on your experience and practice in the Egyptian healthcare sector, how would you evaluate the level of Knowledge, perceptions and attitudes of the Egyptian patients towards generic medicines, and the substitution of a brand medicine with its generic counter-part	من واقع خبرتك وعمك في القطاع الصحي , كيف تقيم مستوي معرفة وانطباعات المرضي المصريين تجاه استخدام الأدوية الجنيسة، ومدي تقبلهم لفكرة استبدال الدواء الأصلي بالجنيس المحلي
	What possible interventions might enhance the acceptance and trustworthiness of generic medicines, in the Egyptian context?	ما هي أهم الإجراءات / السياسات التي يمكن ان ترفع ثقة المرضي في استخدام الأدوية الجنيسة في مصر

Category	Guiding Questions	
Policy Makers & Representatives from MOHP/EDA	What are the main highlights of regulating the pharmaceutical industry in Egypt?	ما هي أهم ملامح الرقابة علي الصناعة الدوائية في مصر
	How have the economic situations that the country experienced in the last period affected the pharmaceutical market?	مرت الدولة المصرية ببعض الأزمات الاقتصادية خلال السنوات الماضية، وخاصة بعد تحرير سعر الصرف في ٢٠١٦، كيف أثر ذلك علي سوق الدواء المصري
	What were the main interventions done? What other measures or policies you might be considering?	ما هي أهم الإجراءات التي تم اتخاذها في هذا الصدد؟ وما هي الإجراءات او الخطط الأخرى الجاري العمل عليها
	How do you see the market of generic medicines in Egypt? And its potential (if any)	ما هو تقييمك لسوق الأدوية الجنيسة في مصر، وما مدى فرصه المستقبلية
	What are the main regulatory measures that ensures the effectiveness, safety, and quality of Generic medicines in comparison to brand-name medicines?	ما هي أهم الإجراءات الرقابية التي يتم اتخاذها لضمان فعالية وجودة ومأمونية الأدوية الجنيسة بالمقارنة مع الأدوية الأصيلة / المبتكرة
Representatives from the industry (local, and multinationals)	How the economic situations that the country experienced in the last period affected the pharmaceutical market?	مرت الدولة المصرية ببعض الأزمات الاقتصادية خلال السنوات الماضية، وخاصة بعد تحرير سعر الصرف في ٢٠١٦، كيف أثر ذلك علي سوق الدواء المصري
	How do you see the market of generic medicines in Egypt, weakness points, future opportunities and potential?	ما هي أهم ملامح سوق الأدوية الجنيسة في مصر، نقاط القوة، نقاط الضعف، الفرص المستقبلية؟
	What possible interventions might enhance the acceptance and trustworthiness of generic medicines, in the Egyptian context.	ما هي أهم الإجراءات / السياسات التي يمكن ان ترفع ثقة المرضي في استخدام الأدوية الجنيسة في مصر

Appendix (VII): Variables Used in the Analysis

#	Name	Label	Type	Values		Description
I – Socio-Demographic Variables						
1	age	Age	Scale			
2	age_c	Age	Ordinal	<= 29	1	IF (age <= 29) age_c=1
				30-39	2	IF (30 >= age <= 39) age_c=2
				40-49	3	IF (40 >= age <= 49) age_c=3
				50-59	4	IF (50 >= age <= 59) age_c=4
				>= 60	5	IF (60 >= A110 <= 59) age_c=5
3	sex	Sex	Nominal	Male	1	
				Female	0	
4	residence_type	Type of Place of Residence	Nominal	Urban	1	
				Rural	0	
5	governorate	Governorates	Nominal	Cairo	1	
				Alexandria	2	
				Port Said	3	
				Suez	4	
				Damietta	11	
				Dakahlia	12	
				Sharkia	13	
				Kalyubia	14	
				Kafr El-Sheikh	15	
				Gharbia	16	
				Menoufia	17	
				Behera	18	
				Ismailia	19	
				Giza	21	
				Beni Suef	22	
				Fayoum	23	
				Menya	24	
				Assuit	25	
				Souhage	26	
				Qena	27	
				Aswan	28	
				Luxor	29	
				Red Sea	31	
				New Valley	32	
				Matroh	33	
				Sinai	35	

#	Name	Label	Type	Values		Description
6	regions	Regions	Nominal	Urban Governorates	1	Cairo, Alexandria, Port Said , Suez
				Lower Egypt	2	Damietta, Dakahlia, Sharkia, Kalyubia, Kafr El-Sheikh, Gharbia, Menoufia, Behera, Ismailia
				Upper Egypt	3	Giza, Beni Suef, Fayoum, Menya, Assuit, Souhage, Qena, Aswan, Luxor
				Frontier Governorate	4	Red Sea, New Valley, Matroh, North Sinai, South Sinai
7	income	Income Level	Ordinal	Very Poor (Under EGP 1,500)	1	
				Poor (Between EGP 1,500 and EGP 3,000)	2	
				Middle (Between EGP 3,000 and EGP 10,000)	3	
				Rich (Between EGP 10,000 and EGP 20,000)	4	
				Very Rich (More than EGP 20,000)	5	
				I do not like to answer	88	considered as missing data
8	education	Education	Ordinal	No Education	1	
				Primary Complete/ Some Secondary	2	
				Secondary Complete/ Diplome	3	
				University Degree	4	
				Post-graduate Degree	5	
9	work status	work status	Nominal (Dummy)	Working for Cash	1	
				Not Working for Cash	0	
10	marital_status	Marital Status	Nominal	Married	1	
				Not Married	0	

#	Name	Label	Type	Values		Description
11	profession	Profession	Nominal	Non-Medical Field	1	all non-medical + not working
				Medical Field (Physician, Pharmacist, Nurse..etc.)	2	
				Pharmacist	3	
				Physician	4	
12	profession_pp	Profession	Nominal (Dummy)	Medical Field (Physician, Pharmacist, Nurse..etc.)	0	IF (profession=2,3,4), profession_pp=0
				Non-Medical Field	1	
II - Health Profile and Spending on Medicines Variables						
13	insurance	Health Insurance	Nominal	Yes, Completely	1	Are you covered by any insurance (public, private, work-related, etc)?
				Yes, Partially	2	
				Yes, but Not utilized	3	
				No	4	
14	med_cov	Medicines' cost coverage	Nominal	Health Insurance	1	The cost of your medicines is covered by insurance, or paid out-of-pocket?
				Out-of-Pocket	2	
				Both	3	
15	out_of_pocket	Out-of-Pocket Spending on Medicines	Scale			Out of pocket expenditure on health (monthly average)*
				Not Defined	NA	
16	pharma_visit	Pharmacy Visits	Ordinal	Once a week	1	Average Number of Visits to Pharmacy (Community or Hospital Pharmacy)
				Once a month	2	
				Once every 3 months	3	
				Once every 6 months or less	4	
				Not Regular / When Needed	5	
17	med_reg_use	Medicines' Regular Use	Nominal	Yes	1	Regular medicines use for chronic diseases (diabetes, hypertension, cholesterol)
				No	0	
III - Generic versus Originator (branded) Medicine Variables						
18	K1	Familiarity with the term "Generic Medicine"	Nominal	Yes	1	Are you familiar with the term "Generic Medicine"
				No	2	
				Not Sure	3	
19	K1_D	_____D	Dummy	Yes	1	
				Other	0	

#	Name	Label	Type	Values		Description
20	K2	Another Brand	Nominal	**True**	**1**	A generic medicine is another brand name for the same drug (active substance)
				False	2	
				I do not know	3	
21	K2_D	_____D	Dummy	True	1	
				Other	0	
22	K3	Cheaper	Nominal	**True**	**1**	A generic medicine is cheaper than the originator 'branded' medicine
				False	2	
				I do not know	3	
23	K3_D	_____D	Dummy	Yes	1	
				Other	0	
24	K4(reversed!!)	One Originator and many Generics	Nominal	**False**	**1**	For each medicine (active ingredient); there are many originator medicines, while there is only one generic medicine
				True	2	
				I do not Know	3	
25	K4_D (reversed!!)	_____D	Dummy	False	1	
				Other	0	
26	K5	One Originator and many Generics	Nominal	**Similar**	**1**	What is a generic?
				Substitute	2	
				Both	3	
				I Do not Know	4	
27	K5_D		Dummy	Similar	1	
				Other	0	
28	K6(reversed!!)	Both Locally Manufactured or Imported	Nominal	**False**	**1**	The generic medicine is the locally manufactured medicine (local Egyptian medicine); while the originator, is the imported one
				True	2	
				I do not Know	3	
29	K6_D (reversed!!)	_____D	Dummy	False	1	
				Other	0	
30	K7	Different Brand Names for different Companies	Nominal	**True**	**1**	A generic medicine can be marketed under different brand names, for a number of pharmaceutical companies
				False	2	
				I do not Know	3	
31	K7_D	_____D	Dummy	True	1	
				Other	0	
32	K8	same API, Conc., DF, and indication	Nominal	**True**	**1**	Both originator and generic medicine have the same API, pharmaceutical form, concentration, and indication
				False	2	
				I do not Know	3	
33	K8_D	_____D	Dummy	True	1	
				Other	0	
34	K9	same safety & effectiveness	Nominal	**True**	**1**	Both the originator 'branded' medicine and the generic medicine have the same effectiveness and safety
				False	2	
				I do not Know	3	
35	K9_D	_____D	Dummy	True	1	
				Other	0	

#	Name	Label	Type	Values		Description
36	K10	Different Package, flavor, color	Nominal	**True**	**1**	Generic medicines and originator 'branded' medicine have different box (package), flavor and color
				False	2	
				I do not Know	3	
37	K10_D	_____D	Dummy	True	1	
				Other	0	
38	K_S	Knowledge with the concept of "Generic Medicine"	Composite Variable	"scale from 1 – 10"		composite variable summarizes the correct knowledge about the concept of generic medicines K_C = sum (K1_D: K10-D)
39	K_C	Overal Knowledge about Generic Medicines	Ordinal	Limited Knowledge	1	(K_S from "0" to "5")
				Fair knowledge	2	(K_S from "6" to "8")
				Good knowledge	3	(K_S from "9" to "10")
40	K_Source	Source of Information about Generic Medicines	Nominal	Physician	1	
				Pharmacist	2	
				Other healthcare provider (nurse, etc.)	3	
				Mass media; TV, Radia…etc	4	
				Reading materials, newspaper, magazines, etc	5	
				Family and Friends	6	
				Internet	7	
				"None (It is the first time to know about generic medicine)"	8	
				Others	9	
41	use	Prior Use of Generic (after explanation)	Nominal	Yes	1	
				No	2	
				May be / Not Sure	3	
42	awareness_need	Need for Awareness	Nominal	Yes	1	Do you think public (users) need to get more awareness and information about generic medicines
				No	0	

#	Name	Label	Type	Values		Description
43	P1 (reversed!!)	Longer time to be Effective	scale	Strongly Disagree	6	I believe that "Generic medicines take longer time to be effective"
					5	
					4	
					3	
					2	
				Strongly Agree	1	
44	P1_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
45	P2	Good for Less Serious Disease	scale	Strongly Disagree	1	I believe that "Generic medicines are good for less serious diseases" Stand alone … (Not used)
					2	
					3	
					4	
					5	
				Strongly Agree	6	
46	P3 (reversed!!)	Lower Quality Substances	scale	Strongly Disagree	6	I believe that "Generic medicines are made with lower quality substances."
					5	
					4	
					3	
					2	
				Strongly Agree	1	
47	P3_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
48	P4 (reversed!!)	Higher Doses to be effective	scale	Strongly Disagree	6	I believe that "Generic medicines need higher doses to be efficacious/effective"
					5	
					4	
					3	
					2	
				Strongly Agree	1	
49	P4_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
50	P5	Same Quality Control	scale	Strongly Disagree	1	I believe that "Generic medicines have the same quality control as the originator branded medicine"
					2	
					3	
					4	
					5	
				Strongly Agree	6	
51	P5_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
52	P6	Same Effect	scale	Strongly Disagree	1	I believe that "Generic medicines have the same effect as the
					2	

#	Name	Label	Type	Values		Description
					3	originator branded medicine"
					4	
					5	
				Strongly Agree	6	
53	P6_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
54	P7	Same Illnesses	scale	Strongly Disagree	1	I believe that "Generic medicines are used for the same illnesses as the originator branded medicine"
					2	
					3	
					4	
					5	
				Strongly Agree	6	
55	P7_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
56	P8	Same Safety	scale	Strongly Disagree	1	I believe that "Generic medicines have the same safety to as the originator branded medicine"
					2	
					3	
					4	
					5	
				Strongly Agree	6	
57	P8_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
58	P9	Overall Similarity	scale	Strongly Disagree	1	I believe that "Generic medicines have overall similarity to the originator branded medicine"
					2	
					3	
					4	
					5	
				Strongly Agree	6	
59	P9_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
60	P10 (reversed!!)	Trust	scale	Strongly Disagree	6	“I would trust more the originator branded medicine than a generic medicine”
					5	
					4	
					3	
					2	
				Strongly Agree	1	
61	P10_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
62	P11 (reversed!!)	Safety (Side Effects)	scale	Strongly Disagree	6	I believe that “Generic medicines have more undesirable effects
					5	

#	Name	Label	Type	Values		Description
					4	(side-effects) than originator (innovator) branded medicine"
					3	
					2	
				Strongly Agree	1	
63	P11_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
64	P12 (reversed!!)	Trust (Substitution)	scale	Strongly Disagree	6	"I would be worried if my medication was changed from originator branded medicine to generic medicine"
					5	
					4	
					3	
					2	
				Strongly Agree	1	
65	P12_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
66	P13	Production Standards	scale	Strongly Disagree	1	I believe that "The production standards of both the generic medicines, and the originator branded medicine, are the same"
					2	
					3	
					4	
					5	
				Strongly Agree	6	
67	P13_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
68	P14	Trust in Regulatory Authority (Production Standards)	scale	Strongly Disagree	1	I believe that "Concerned health regulatory authorities are able to detect possible irregularities in the production of generic medicines
					2	
					3	
					4	
					5	
				Strongly Agree	6	
69	P14_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
70	P15	Trust in Regulatory Authority (substandard batches)	scale	Strongly Disagree	1	I believe that "Concerned health regulatory authorities are able to detect, in time, and recall batches of generic medicines with reduced effectiveness and/or safety
					2	
					3	
					4	
					5	
				Strongly Agree	6	
71	P15_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
72	P16	Fiscal Impact	scale	Strongly Disagree	1	I believe that "the use of generic medicines

#	Name	Label	Type	Values		Description
					2	will reduce the total cost of therapy"
					3	
					4	
					5	
				Strongly Agree	6	
73	P16_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
74	P17 (reversed!!)	Lower cost due to quality	scale	Strongly Disagree	6	I believe that "Generic medicines are cheaper because they are less effective"
					5	
					4	
					3	
					2	
				Strongly Agree	1	
75	P17_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
76	Pharmacist_Substitution	Substitution by Pharmacist	scale	Strongly Disagree	1	I believe that "Substitution of originator branded medicine with generic medicines can also be done by pharmacists"
					2	
					3	
					4	
					5	
				Strongly Agree	6	
77	P_E	Perception towards generic effectiveness/efficacy	Composite Variable	Scale From 1 to 10		summarizes the participant perception towards effectiveness/ efficacy of generic medicine P_E = average (P1, P4, P6, P7, P9) *Standardized to be from (1-10) [divided on 6 & multiplied by 10)]
78	P_S	Perception towards generic safety	Composite Variable	Scale From 1 to 10		summarizes the participant perception towards the safety of generic medicine P_S = average (P8, P11) *Standardized to be from (1-10) [divided on 6 & multiplied by 10)]
79	P_Q	Perception towards generic quality and quality assurance	Composite Variable	Scale From 1 to 10		summarizes the participant perception towards generic safety P_Q = average (P3, P5, P13, P14, P15, P17) *Standardized to be from (1-10) [divided on 6 & multiplied by 10)]

#	Name	Label	Type	Values		Description
80	P_C	Perception towards generics' cost and financial impact	scale	Scale From 1 to 10		P16 standardized to be from (1-10) [divided on 6 & multiplied by 10)]
81	P_overall	Overall Perception towards generic medicine	Composite Variable	Scale From 1 to 10		summarizes the participant perception towards the generics P_overall = average (P1:P17)[23] *Standardized to be from (1-10) [divided on 6 & multiplied by 10)
82	A1	Attitude_Cheaper	scale	Strongly Disagree	1	I will choose a Generic medicine, if it is significantly Cheaper than the originator branded medicine
					2	
					3	
					4	
					5	
				Strongly Agree	6	
83	A1_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
84	A2	Attitude_Minor Condition	scale	Strongly Disagree	1	I will choose a Generic medicine, if it was for a minor condition (common cold, allergy, headache)
					2	
					3	
					4	
					5	
				Strongly Agree	6	
85	A2_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
86	A3	Attitude_Any Condition	scale	Strongly Disagree	1	I will choose a Generic medicine, for any condition; minor or major
					2	
					3	
					4	
					5	
				Strongly Agree	6	
87	A3_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
88	A4	Attitude_Chronic Condition	scale	Strongly Disagree	1	I will choose a Generic medicine, if it was for chronic conditions (Hypertension, diabetes, etc)
					2	
					3	
					4	
					5	
				Strongly Agree	6	

[23] with the exception of P2 (due to validity issues)

#	Name	Label	Type	Values		Description
89	A4_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
90	A5	Attitude_Imported	scale	Strongly Disagree	1	I will choose a Generic medicine, if it was imported
					2	
					3	
					4	
					5	
				Strongly Agree	6	
91	A5_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
92	A6	Attitude_pharmacist advice	scale	Strongly Disagree	1	I will choose a Generic medicine, if advised from the pharmacist
					2	
					3	
					4	
					5	
				Strongly Agree	6	
93	A6_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
94	A7	Attitude_physician prescription	scale	Strongly Disagree	1	I will choose a Generic medicine, if prescribed by a physician
					2	
					3	
					4	
					5	
				Strongly Agree	6	
95	A7_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
96	A8	Attitude_Originator	scale	Strongly Disagree	1	I will always choose the originator branded medicine
					2	
					3	
					4	
					5	
				Strongly Agree	6	
97	A8_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
98	A8_D_r	_____D_r	Dummy	Yes (agree)	0	Reversing the coding of A8_D
				No (disagree)	1	
99	A9	Attitude_minor financial cost	scale	Strongly Disagree	1	I will choose the originator branded medicine if price difference with the
					2	
					3	

#	Name	Label	Type	Values		Description
					4	generic was small
					5	
				Strongly Agree	6	
100	A9_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
101	A9_D_r	_____D_r	Dummy	Yes (agree)	0	
				No (disagree)	1	
102	A10	Attitude_side effects	scale	Strongly Disagree	1	I will choose the originator branded medicine if any side effects started to happen after using the medication
					2	
					3	
					4	
					5	
				Strongly Agree	6	
103	A10_D	_____D	Dummy	Yes (agree)	1	
				No (disagree)	0	
104	A10_D_r	_____D_r	Dummy	Yes (agree)	0	
				No (disagree)	1	
105	A_overall	Overall Attitude towards using generic medicine	Composite Variable	Scale From 1 to 10		summarizes the participant attitude towards using a generic medicine A_overall = sum (A1:A10)[24]
106	A11	Attidue_Influencing factor	scale	Price	1	Which factor has the highest impact on your preference, or decision, to use a Generic Medicine
				Medical Condition	2	
				Manufacturing Status (Imported - Generic)	3	
				Pharmacist Advise	4	
				Physician Opinion	5	
				Other	6	

[24] Variables (A8_D), (A9-D) and (A10_D) were reversed for the purpose of calculating (A_overall), to maintain that a score of (1) reflect using a generic not an originator medicine.

Appendix (VIII): The IRB Approval

CASE #2018-2019-128

THE AMERICAN UNIVERSITY IN CAIRO
INSTITUTIONAL REVIEW BOARD

To: Radwa Elmoneer

Cc: Menna Abdel Hamid

From**:** Atta Gebril, Chair of the IRB

Date**:** May 11, 2019

Re**:** Approval of study

This is to inform you that I reviewed your revised research proposal entitled "**Assessing Egyptian Patients' Knowledge, Perceptions, and Attitudes towards the Use of Generic Medicines**" and determined that it required consultation with the IRB under the "expedited" category. As you are aware, the members of the IRB suggested certain revisions to the original proposal, but your new version addresses these concerns successfully. The revised proposal used appropriate procedures to minimize risks to human subjects and that adequate provision was made for confidentiality and data anonymity of participants in any published record. I believe you will also make adequate provision for obtaining informed consent of the participants.

This approval letter was issued under the assumption that you have not started data collection for your research project. Any data collected before receiving this letter could not be used since this is a violation of the IRB policy.

Please note that IRB approval does not automatically ensure approval by CAPMAS, an Egyptian government agency responsible for approving some types of off-campus research. CAPMAS issues are handled at AUC by the office of the University Counsellor, Dr. Ashraf Hatem. The IRB is not in a position to offer any opinion on CAPMAS issues, and takes no responsibility for obtaining CAPMAS approval.

This approval is valid for only one year. In case you have not finished data collection within a year, you need to apply for an extension.

Thank you and good luck.

Atta Gebril

Dr. Atta Gebril
IRB chair, The American University in Cairo
2046 HUSS Building
T: 02-26151919
Email: agebril@aucegypt.edu

Institutional Review Board
The American University in Cairo
AUC Avenue, P.O. Box 74
New Cairo 11835, Egypt.
tel 20.2.2615.1000
fax 20.2.27957565
Email: aucirb@aucegypt.edu

Appendix (IX): The Informed Consent Form (Questionnaire)

THE AMERICAN UNIVERSITY IN CAIRO

الموافقة على المشاركة في دراسة بحثية

عنوان البحث: "تقييم مستوى المعرفة, والإنطباعات, والتوجهات لدى المرضى المصريين تجاه إستعمال الأدوية الجنيسة (المماثلة)"

الباحث الرئيسي: رضوى أحمد المنير
طالبة فى الجامعة الأمريكية

البريد الالكتروني: relmoneer@aucegypt.edu, radwa_elmoneer@hotmail.com
الهاتف: ٠١١ ٤٥٤ ٣٩ ٤٥٤ (٢+)

انت مدعو للمشاركة فى دراسة بحثية عن "تقييم مستوى المعرفة، والإنطباعات، والتوجهات؛ لدى المرضى المصريين تجاه إستعمال الأدوية الجنيسة (المماثلة)،" كجزء من المتطلبات الأكاديمية بالجامعة. هدف الدراسة هو فهم طبيعة مستخدمي الأدوية في مصر، وبالتالي تحسين توافر الأدوية.

نتائج البحث ستنشر فى (رسالة الماجيستير بالجامعة؛ وربما دوريه متخصصه أو مؤتمر علمي أو ربما كليهما).

المدة المتوقعة المشاركة فى هذا البحث تستلزم

- ملئ استقصاء (لا يتعدى ٣٠ دقيقة)

اجراءات الدراسة:
تشتمل على الإجابة على بعض الأسئلة المتعلقة بموضوع البحث؛

بحيث تكون الإجابات من واقع الخبرة الشخصية والعملية. لا توجد مخاطر متوقعة من المشاركة في الدراسة. أيضاً، لا توجد أي استفادة عينية من المشاركة في البحث.

كافة المعلومات التى ستدلى بها فى هذا البحث سوف تكون هويتك غير محددة في البحث (إلا إذا تمت الموافقة على غير ذلك)، أي ان هناك احترام كامل للسرية واحترام الخصوصية.

- إذا زادت المخاطر المتوقعة نتيجة هذا البحث عن الحد الادنى المقبول أوعند الرغبة فى الحصول على مزيد من المعلومات عن الدراسة وحقوق المشاركين وكذلك فى حالة حدوث أي اصابة أثناء المشاركة فى هذا البحث. على سبيل المثال يمكنك كتابة التالى: " أي أسئلة متعلقة بهذه الدراسة أو حقوق المشاركين فيها أوعند حدوث أى اصابات ناتجة عن هذه المشاركة يمكن الاتصال والتوجه الى الباحث الرئيسى (رضوى أحمد المنير) على الهاتف (٠١١ ٤٥٤ ٣٩ ٤٥٤ (٢+)).

ان المشاركة فى هذه الدراسة ماهى الا عمل تطوعى، حيث أن الامتناع عن المشاركة لايتضمن أى عقوبات أو فقدان أى مزايا تحق لك. ويمكنك أيضا التوقف عن المشاركة فى أى وقت من دون عقوبة أو فقدان لهذه المزايا.

الامضاء: .....

اسم المشارك : .....

التاريخ : ...../...../.....

THE AMERICAN UNIVERSITY IN CAIRO

Informed Consent for Participation in Research Study

Project Title: "Assessing Egyptian Patients' Knowledge, Perceptions, and Attitudes towards the Use of Generic Medicines"

Principal Investigator: Radwa Ahmed Elmoneer

Student at the American University in Cairo

Email: relmoneer@aucegypt.edu , radwa_elmoneer@hotmail.com

Tel: (+2) 011 454 39 454

*You are being asked to participate in a research study about "Assessing Egyptian Patients' Knowledge, Perceptions, and Attitudes towards the Use of Generic Medicines." The purpose of the research is to understand the knowledge, perceptions, and attitudes of Egyptian patients towards the use. The findings should be published in the *thesis*, and may be further [*published, presented, or both*].

The procedures of the research will involve filling in a previously prepared questionnaire, (not exceeding 30 minutes)

The asked questions pertain to the topic and the answers should be based on your experience. There *will not be* any risks or discomforts associated with this research. Additionally, there *will not be* benefits to you from this research. The information provided by you, for purposes of this research, *is confidential*, and will be anonymous, in the research.

* For answers to pertinent questions about the research and research subject's rights, and in the event of a research-related injury to the subject; for example: "Questions about the research, my rights, or research-related injuries, please contact and direct your questions for the principal (Radwa Ahmed Elmoneer) at (+2 011 454 39 454)."

* Participation in this study is voluntary. Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may discontinue participation at any time without penalty or the loss of benefits to which you are otherwise entitled.

Signature _____

Printed Name _____

Date _____

Appendix (IX): The Informed Consent Form (Interview)

THE AMERICAN UNIVERSITY IN CAIRO

الموافقة على المشاركة في دراسة بحثية

عنوان البحث: "تقييم مستوى المعرفة, والإنطباعات, والتوجهات لدى المرضى المصريين تجاه إستعمال الأدوية الجنيسة (المماثلة)"

الباحث الرئيسي: رضوى أحمد المنير
طالبة فى الجامعة الأمريكية

البريد الالكتروني: relmoneer@aucegypt.edu, radwa_elmoneer@hotmail.com
الهاتف: ٠١١ ٤٥٤ ٣٩ ٤٥٤ (٢+)

انت مدعو للمشاركة فى دراسة بحثية عن "تقييم مستوى المعرفة، والإنطباعات، والتوجهات؛ لدى المرضى المصريين تجاه إستعمال الأدوية الجنيسة (المماثلة)،" كجزء من المتطلبات الأكاديمية بالجامعة. هدف الدراسة هو فهم طبيعة مستخدمي الأدوية في مصر، وبالتالي تحسين توافر الأدوية.

نتائج البحث ستنشر فى (رسالة الماجيستير بالجامعة؛ وربما دوريه متخصصه أو مؤتمر علمي أو ربما كليهما).

المدة المتوقعة المشاركة فى هذا البحث تستلزم الإجابة علي بعض الأسئلة التي تستغرق من ٤٠ وحتي ٦٠ دقيقة بحد أقصى.

اجراءات الدراسة:
تشتمل على اجراء حوار والإجابة على بعض الأسئلة المتعلقة بموضوع البحث؛

بحيث تكون الإجابات من واقع الخبرة الشخصية والعملية. لا توجد مخاطر متوقعة من المشاركة في الدراسة. أيضاً، لا توجد أي استفادة عينية من المشاركة في البحث.

كافة المعلومات التى ستدلى بها فى هذا البحث سوف تكون هويتك غير محددة في البحث (إلا إذا تمت الموافقة على غير ذلك)، أي ان هناك احترام كامل للسرية واحترام الخصوصية.

- إذا زادت المخاطر المتوقعة نتيجة هذا البحث عن الحد الادنى المقبول أوعند الرغبة فى الحصول على مزيد من المعلومات عن الدراسة وحقوق المشاركين وكذلك فى حالة حدوث أي اصابة أثناء المشاركة فى هذا البحث. على سبيل المثال يمكنك كتابة التالى: " أي أسئلة متعلقة بهذه الدراسة أو حقوق المشاركين فيها أوعند حدوث أى اصابات ناتجة عن هذه المشاركة يمكن الاتصال والتوجه الى الباحث الرئيسى (رضوى أحمد المنير) على الهاتف (٠١١ ٤٥٤ ٣٩ ٤٥٤ (٢+)).

ان المشاركة فى هذه الدراسة ماهى الا عمل تطوعى، حيث أن الامتناع عن المشاركة لايتضمن أى عقوبات أو فقدان أى مزايا تحق لك. ويمكنك أيضا التوقف عن المشاركة فى أى وقت من دون عقوبة أو فقدان لهذه المزايا.

الامضاء: .....

اسم المشارك : .....

التاريخ : ...../...../.....

THE AMERICAN UNIVERSITY IN CAIRO

Informed Consent for Participation in Research Study

Project Title: "Assessing Egyptian Patients' Knowledge, Perceptions, and Attitudes towards the Use of Generic Medicines"

Principal Investigator: Radwa Ahmed Elmoneer

Student at the American University in Cairo

Email: relmoneer@aucegypt.edu , radwa_elmoneer@hotmail.com

Tel: (+2) 011 454 39 454

*You are being asked to participate in a research study about "Assessing Egyptian Patients' Knowledge, Perceptions, and Attitudes towards the Use of Generic Medicines." The purpose of the research is to understand the knowledge, perceptions, and attitudes of Egyptian patients towards the use. The findings should be published in the *thesis*, and may be further [*published, presented, or both*].

The procedures of the research is answering a number of questions (a semi-structured or in-depth interview) which might take between 40 to 60 minutes.

The asked questions pertain to the topic and the answers should be based on your experience. There *will not be* any risks or discomforts associated with this research. Additionally, there *will not be* benefits to you from this research. The information provided by you, for purposes of this research, *is confidential*, and will be anonymous, in the research.

* For answers to pertinent questions about the research and research subject's rights, and in the event of a research-related injury to the subject; for example: "Questions about the research, my rights, or research-related injuries, please contact and direct your questions for the principal (Radwa Ahmed Elmoneer) at (+2 011 454 39 454)."

* Participation in this study is voluntary. Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may discontinue participation at any time without penalty or the loss of benefits to which you are otherwise entitled.

Signature _____

Printed Name _____

Date _____

Appendix (X): Participants from Different Egyptian Governorates

Variable	Total		Individuals with No medical Background		Individuals with Medical Background	
	n=601		n=389		n= 212	
Governorate						
Cairo	287	(47.75)	177	(45.38)	110	(52.13)
Alexandria	22	(3.66)	21	(5.38)	1	(0.47)
Port Said	2	(0.33)	2	(0.51)	-	-
Suez	1	(0.17)	1	(0.26)	-	-
Damietta	5	(0.83)	3	(0.77)	2	(0.95)
Dahahlia	14	(2.33)	11	(2.82)	3	(1.42)
Sharkia	40	(6.66)	32	(8.21)	8	(3.79)
Kalyubia	10	(1.66)	5	(1.28)	5	(2.37)
Kafr El-Sheikh	6	(1.00)	3	(0.77)	3	(1.42)
Gharbia	16	(2.66)	9	(2.31)	7	(3.32)
Menoufia	14	(2.33)	5	(1.28)	9	(4.27)
Behera	4	(0.67)	4	(1.03)	-	-
Ismailia	6	(1.00)	1	(0.26)	5	(2.37)
Giza	87	(14.48)	54	(13.85)	33	(15.64)
Beni Suef	12	(2.00)	7	(1.79)	5	(2.37)
Fayoum	22	(3.66)	15	(3.85)	7	(3.32)
Menya	2	(0.33)	2	(0.51)	-	-
Assuit	17	(2.83)	11	(2.82)	6	(2.84)
Souhage	21	(3.49)	16	(4.10)	5	(2.37)
Qena	3	(0.50)	3	(0.77)	-	-
Aswan	4	(0.67)	4	(1.03)	-	-
Luxor	2	(0.33)	2	(0.51)	-	-
Matroh	2	(0.33)	1	(0.26)	1	(0.47)
Sinai	2	(0.33)	1	(0.26)	1	(0.47)

Appendix (XI): Prevalence of Some Generic Mis-Conceptualized Characteristics among Physicians, Pharmacists and Lay Public, Study Sample, Egypt, 2019

(a) The Confusion between Similar and Substitute

	Similar	Substitute	Both	Do not Know
Total Participants	**32%**	10%	19%	39%
Non-Medical Participants (lay public)	**16%**	13%	15%	56%
Physicians	**29%**	6%	38%	26%
Pharmacists	**69%**	6%	21%	3%

(b) The Confusion between being a 'Generic' and being 'Locally Manufactured'

	Both can be 'Locally Manufactured' or 'Imported'	Generic is the Locally Manufactured Product	Do not Know
Total Participants	**33%**	26%	41%
Non-Medical Participants (lay public)	**19%**	23%	58%
Physicians	**53%**	21%	26%
Pharmacists	**63%**	32%	5%

"It always seems impossible until its done"
(Nelson Mandela)