Attitude and Challenges of Consumers and Pharmacists Towards Reporting Counterfeit Medicines in Lagos State, Nigeria

Research dissertation presented in partial fulfilment of the requirements for the degree of MSc in Pharmaceutical Business and Technology (QQI)

Innopharma Faculty of Pharmaceutical Sciences

Griffith College Dublin

Dissertation supervisor: Chiamaka Chiedozie

Sinclair Chibuzor Hillary

May 2023

CANDIDATE DECLARATION

Candidate Name: Sinclair Chibuzor Hillary

I certify that the dissertation entitled:

“Attitude and Challenges of Consumers and Pharmacists towards Reporting Counterfeit Medicines in Lagos State, Nigeria” submitted for MSc in Pharmaceutical Business and Technology is the result of my own work and that where reference is made to the work of others, due acknowledgment is given.

Candidate signature: Sinclair Chibuzor Hillary

Date: 12-May-2023

Supervisor Name: Chiamaka Chiedozie

Supervisor signature:

Date: 12-May-2023

ACKNOWLEDGEMENT

I am deeply grateful to God for bestowing His grace and mercy upon my life, as well as my family and loved ones.

I dedicate this dissertation to my father, Chief Hillary Nsorom, whose constant love, encouragement, and guidance have been the driving force behind my academic pursuits. Your unwavering support and belief in me have instilled the confidence and determination needed to see this journey through. Thank you for being my pillar of strength and for always being there for me.

I extend my heartfelt appreciation to my supervisor, Chiamaka Chiedozie, for her support and guidance in various stages of this dissertation. Her insights and feedback were invaluable in shaping this research project.

Furthermore, I would like to express my gratitude to my mentor, Distinguished Pharmacist Josephine Ehimen, for her immense support throughout my master's program. Her guidance and advice were pivotal in my academic success.

In addition, I am grateful to the respondents who participated in this study. Their experiences and opinions provided the necessary data for this research, and I appreciate their willingness to share.

Finally, I would like to thank my lecturers at Griffith College Dublin, Ireland, for their dedication and provision of resources that made the master's program a success. I am grateful for their contributions to my academic journey.

ABSTRACT

Counterfeit medicines are drugs deliberately misbranded, mislabeled, or adulterated with the intention of deceiving people into thinking they are genuine. Consumers and pharmacists play vital roles in reducing their circulation by reporting suspicious products to the authorities. Such information provides the regulatory authorities with valuable insights, enabling them to take necessary actions to stop the distribution and sale of these drugs. This study aimed to evaluate the knowledge of consumers and pharmacists in Lagos regarding the presence of counterfeit drugs in the Nigerian market, their associated risks, and their attitudes toward reporting such drugs. Additionally, the study investigated the challenges these groups faced when reporting such drugs and provided recommendations for overcoming these obstacles.

The study collected primary data through an online questionnaire survey and phone interviews. The survey received responses from 182 consumers and 126 pharmacists, while the phone interviews were conducted with 8 highly experienced pharmacists to obtain their personal perspectives on the subject matter.

Analysis of the collected data revealed that consumers and pharmacists in Lagos exhibited a high level of awareness about the presence of counterfeit medicines in Nigeria and the health risks associated with them. However, both groups demonstrated reluctance to report such medicines. The study revealed that the two groups faced similar challenges when reporting counterfeit medicines, with the most common problems, as noted by the majority of respondents in each group being a lack of knowledge on how to report (70.9% consumers, 51.6% pharmacists), difficulty in identifying counterfeit medicines (69.8% consumers, 64.3% pharmacists), and lack of confidence in the regulatory authority's effort in combating the issue (69.8% consumers, 54.8% pharmacists).

To address these challenges, the study proposed providing education and awareness programs to teach people how to identify and report counterfeit medicines, as well as providing feedback to individuals regarding the status of their reports and investigations. The researcher recommended that NAFDAC prioritize addressing the challenges which were identified by the largest number of participants in both groups to improve the reporting of counterfeit medicines in Lagos.

Key Words: Counterfeit medicines, knowledge, awareness, challenges, attitudes, consumers, public, pharmacists, and National Agency for Food and Drug Administration and Control (NAFDAC).

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ABBREVIATIONS

CFM-	Counterfeit Medicines
MAS-	Mobile Authentication
NAFDAC-	National Agency for Food and Drug Administration and Control
NMRA-	National Medicines Regulatory Authorities
NRN-	NAFDAC Registration Number
PCN -	Pharmacists Council of Nigeria
PMG-MAN -	Pharmaceutical Manufacturers Group of the Manufacturers Association of Nigeria
WHO-	World Health Organization

CHAPTER 1: INTRODUCTION

1.1 Overview

The counterfeiting of drugs is a public health crisis that affects countries globally, with the harmful consequences being experienced by both the manufacturing countries and the recipient countries. As a result, national measures aimed at combating the production and sale of such drugs may be inadequate due to the highly advanced sophistication of the manufacturers and sellers involved (Chinwendu, 2008).

Counterfeit medicines are products that have been intentionally misbranded, mislabeled, or adulterated. They are created and marketed with the intention of deceiving people into thinking that they are genuine. Such products may not contain any active ingredients or may contain insufficient or incorrect components, placing patients at risk of harm (El-Dahiyat *et al.*, 2021; Wala *et al.*, 2022). According to the World Health Organization (WHO), roughly half of the global drug market may be made up of counterfeit products, with many originating from developing nations across Africa, Asia, and Latin America, where they account for 30-60% of all drugs in these regions. Globally, the estimated proportion of counterfeit drugs is between 10-15%, with India responsible for producing 35-75% of these medicines (Glass, 2014; El-Dahiyat *et al.*, 2021).

In Nigeria, the regulatory authorities' efforts to curb the production and distribution of counterfeit drugs have not been completely successful as the illicit business continues to thrive. While the prevalence of such medicines has reduced, dropping from 40% in 2001 to 17% in 2005, it remains a major challenge for essential medicines like antimalarials, antibiotics and antiretrovirals (Adigwe *et al.*, 2022). Shockingly, a report in 2011 revealed that 64% of antimalarials sold in Nigeria were below the expected standard. This difficulty in tackling the issue may be due to the challenge of preventing counterfeit drugs from entering the country, considering that over 70% of drugs are imported, with a substantial proportion originating from India and China, two of the primary global sources of counterfeit medicines (Okereke *et al.*, 2021).

1.1.1 Contributing factors to the prevalence of counterfeit medicines in Nigeria

Counterfeit drugs are prevalent in Nigeria due several reasons such as the inadequate regulation of imported drugs. The National Agency for Food and Drug Administration and Control (NAFDAC) requires that all imported drugs be analyzed and tested to ensure they meet quality and safety standards before they can be sold in Nigeria. Unfortunately, the current drug testing

laboratories are not equipped to handle the large volume of imported drugs. This creates gaps in the system that counterfeiters can exploit to bring in and distribute counterfeit medicines in the country. It is therefore crucial for the government to allocate funds to NAFDAC for the acquisition of the necessary equipment for testing and analyzing of all imported drugs, ensuring that they are safe and effective for use by Nigerians (Chinwendu, 2008).

The absence of suitable drug laws in Nigeria further exacerbates the spread of counterfeit drugs. The conflicting nature of some Nigerian drug laws creates a legal framework that deters law enforcement efforts and makes it challenging to prosecute offenders, providing an incentive for drug counterfeiters to continue with their illicit activities. Thus, it is imperative to review the existing laws to ensure stability in the regulations governing drug laws in Nigeria (Akiny, 2013).

In addition, the lack of severe penalties for drug counterfeiting incentivizes counterfeiters to engage in such illicit activities. When penalties for drug counterfeiting are insufficient to offset the financial gains from such activities, it becomes a profitable venture despite its severe public health implications (Blackstone *et al.*, 2014). In Nigeria, the maximum penalty for violating the decree on fake drugs is a fine of N500,000 or imprisonment for 3 months to 5 years, which is inadequate considering the gravity of the crime. Stiffer penalties, such as those proposed by the previous Director General of NAFDAC, Dr. Paul Orhii, could help deter drug counterfeiters by making their activities less profitable and more challenging to undertake. The proposed bill seeks life imprisonment and asset confiscation upon conviction, as well as compensation for victims where counterfeit drugs are found to be the cause of injury. The severity of drug counterfeiting is comparable to that of murder, and thus, lenient punishment is inadequate in addressing the issue (Akiny, 2013).

The high incidence of counterfeit drugs in Nigeria can also be attributed to the presence of non-professionals in the pharmaceutical industry who prioritize profits over the wellbeing of the community. These individuals lack the ability to detect counterfeit drugs, unlike healthcare professionals who are more observant and can train themselves and their patients to identify such medicines through visual inspection tools like tablet size, shape, packaging and labelling examination (Chika *et al.*, 2011). Suspected cases can then be reported to relevant authorities. To eradicate counterfeit drugs in Nigeria, appropriate authorities must supervise non-professionals such as patent medicine vendors in the pharmaceutical sector (Akiny, 2013).

Furthermore, the high price of medicines in Nigeria also contributes to the availability of counterfeit drugs. Genuine drugs are generally costly, and counterfeiters exploit the situation to supply fake drugs at lower prices to patients who cannot afford the authentic version

(Chinwendu, 2008). According to the National Bureau of Statistics (2022), 63% of the Nigerian population live below the poverty line and are unable to afford good quality medicines due to high cost, and would choose to purchase cheaper counterfeit drugs. About 70% of drugs in the country are imported (Okereke *et al.*, 2021). The high tariffs imposed on them contribute to the high drug costs making it unavailable for most people. To address this issue, it is essential to encourage local drug manufacturing and reduce drug imports (Akiny, 2013).

Nevertheless, the chaotic drug distribution system of Nigeria is also a significant contributor to the prevalence of counterfeit drugs in the country. Unregulated open drug markets, such as the Idumota market in Lagos State and the Ariaria market in Abia State, where medicines are sold publicly in street corners and kiosks, serve as a significant source of medicines for licensed hospitals and pharmacies (Okereke *et al.*, 2021). Many importers choose to supply these markets because of the huge profits they can generate. Due to the absence of strict monitoring, counterfeit medicines enter the legitimate supply chain through these channels. To maintain a consistent supply of high-quality drugs in the Nigerian market, it is crucial to monitor the supply chain at every stage of distribution. Addressing the disordered drug distribution network in the country will require cooperation between the government, legitimate pharmaceutical companies, and supply chain stakeholders (Chinwendu, 2008).

Finally, it is worth mentioning that the prevalence of counterfeit drugs in the country can also be attributed to greed and corruption. These vices are evident among drug regulating authorities, drug manufacturers, and importers. There is weak enforcement of drug laws because corrupt officials have received bribes to turn a blind eye to the trade of counterfeit medicines, allowing the business to thrive (Akiny, 2013).

1.1.2 Implications of Counterfeit Medicines in Nigeria

Counterfeit medicines pose a worldwide issue, but there is a significant difference in the types of drugs counterfeited between developing and developed countries. In developed countries, costly lifestyle medications like sildenafil and tadalafil are commonly counterfeited, while in developing countries such as Nigeria, drugs used to treat life-threatening illnesses such as antibiotics, antimalarials, antiretrovirals and antituberculosis medications are targeted by counterfeiters (Glass, 2014).

The consumption of these medicines can result in significant health risks, such as the emergence of drug resistance that could cause treatment failure or even death. In addition, it may lead to increased health expenses by patients, put further strain on already overburdened healthcare system, and undermine the public's confidence in the healthcare system (Okereke *et al.*, 2021).

There have been various cases of fake medications reported in Nigeria, including a tragic event in 2008 when several children who consumed a teething solution called “My Pikin” suffered from acute kidney injury and died. This solution was contaminated with diethylene glycol (DEG) instead of propylene glycol, which may have been due to accidental or intentional contamination. Similar incidents happened in South Africa in 1969 and Nigeria in 1990 when the same substance was used instead of propylene glycol, leading to 7 and 47 deaths respectively. In addition, a study conducted in Nigeria in 2017 on the quality of commonly available metformin tablets found that half of the medications tested did not pass at least one test for bioequivalence (Okereke *et al.*, 2021).

1.2 Statement of Problem

Counterfeit medicines pose a significant threat to public health in Nigeria, and their presence in the country continues to grow. Although various measures have been implemented to address the issue, these medicines remain prevalent in the market. Previous studies have demonstrated a high degree of awareness among Nigerian consumers and pharmacists regarding counterfeit medicines. However, there is limited information on their willingness to report such medicines and the difficulties they encounter while doing so. This study seeks to fill this knowledge gap by examining the attitude and challenges of consumers and pharmacist toward reporting counterfeit medicines in Lagos, Nigeria’s most populous state and home to one of the largest drug markets in the country, namely the Idumota market. The findings of this study could inform interventions that will reduce the prevalence of counterfeit medicines not only in Lagos but also in other states of Nigeria.

1.3 Purpose of Study

This study was conducted with the purpose of identifying the challenges that consumers and pharmacist face when reporting counterfeit medicines, to improve reporting rates and reduce the prevalence of such drugs in Lagos, and Nigeria. Consumers and pharmacists both have important roles to play in reducing the distribution of counterfeit medicines. Consumers who use medicines for their health needs can report any packaging or appearance inconsistencies to the authorities, while pharmacists can use their expertise to identify suspicious products and report them. Such information provides the regulatory authorities with valuable insights that enable them to take necessary actions to prevent the distribution and sale of these drugs.

By identifying and providing recommendations to overcome the barriers that hinder effective reporting by these groups, this study would contribute to improving the healthcare system in Lagos and Nigeria.

1.4 Significance and justification of study

Counterfeit drugs pose a significant threat to public health in Nigeria and can result in a range of negative consequences, including treatment failure, drug resistance, and even death. Despite various measures being implemented to address the issue, such medicines remain widespread in the country, leading to a pressing need for effective solutions.

The current study will contribute to the existing knowledge on counterfeit medicines in Nigeria by shedding light on the attitudes and challenges encountered by consumers and pharmacists in reporting such drugs to the regulatory authorities. The findings of the study would inform policymakers and the regulatory authorities in developing and implementing strategies that would address the problem of counterfeit drugs in Nigeria.

1.5 Hypothesis

Null Hypothesis (H0), "There is no significant difference in the challenges faced by consumers and pharmacists in Lagos when reporting counterfeit medicines."

Alternate Hypothesis (H1), "The challenges faced by consumers and pharmacists in Lagos when reporting counterfeit medicines are significantly different."

1.6 Research Objectives:

1. To evaluate the awareness of consumers and pharmacists in Lagos about the existence of CFM and the dangers they pose to health.
2. To evaluate the attitude of consumers and pharmacists in Lagos towards reporting counterfeit medicines.
3. To identify the challenges consumers and pharmacists in Lagos face in reporting counterfeit medicines.
4. To recommend solutions for overcoming these challenges to improve reporting of counterfeit medicines in Lagos.

Research Questions

1. What is the level of awareness of consumers and pharmacists in Lagos about the existence of counterfeit medicines and the dangers they pose to health?
2. What is the attitude of consumers and pharmacists toward reporting counterfeit medicines in Lagos, Nigeria?
3. What are the challenges faced by consumers and pharmacists in reporting counterfeit medicines in Lagos, Nigeria?

4. What solutions can be recommended to overcome the challenges faced by consumers and pharmacists in reporting counterfeit medicines in Lagos, Nigeria?

1.7 Scope of study

This dissertation would focus on counterfeit medicine reporting in Lagos, Nigeria, with an emphasis on the practices of consumers and pharmacists in different areas of pharmacy.

1.8 Structure of study

This dissertation comprises five chapters, including an introduction, literature review, research methodology, presentation and analysis of findings, and conclusion & recommendations. The first chapter provides an overview of counterfeit medicines on a global scale, focusing on their prevalence in Nigeria and the health implications. It also outlines the purpose, significance, aims and objectives of the study, as well as the research questions.

The second chapter, the literature review, provides a critical evaluation of the pharmaceutical industry in Nigeria and its regulatory bodies. It explores the awareness of consumers and pharmacists in Nigeria and other countries regarding the existence of counterfeit medicines in their regions, their attitudes towards reporting such medicines to the regulatory authorities, and the challenges encountered while doing so.

The third chapter, the research methodology, discusses the approach taken by the researcher to conduct the study. It presents the study's philosophy, the method of data collection, and its justification.

The fourth chapter, presentation and analysis of findings, displays and interprets the data gathered from the research and examines their relevance to the objectives of the study.

Lastly, the fifth chapter, the conclusion and recommendations, provides answers to the research questions using the interpretation of the study's findings. The chapter also highlights the research contributions to practice, its limitations, and suggestions for future studies in this field.

1.9 Conclusion

The existence of counterfeit medicines in Nigeria poses a threat to the health of the public. Investigating the attitudes and challenges of consumers and pharmacists with regards to counterfeit medicine reporting to improve reporting rates will ultimately safeguard the well-being of the population.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Nigeria, situated on the Western Coast of Africa, has an estimated population of over 215 million people in 2022, making it the most populous country in Africa and the seventh in the world. It comprises 36 States, including the Federal Capital Territory, known as Abuja. Lagos, one of the states in Nigeria, has a population of approximately 15.4 million people and is the largest city in both Nigeria and Sub-Saharan Africa (Statista, 2022a). The country is experiencing rapid population growth, with a rate of 2.6% per year, which is one of the highest globally. At this rate, Nigeria's population could double within the next 30 years (Akinyemi and Mobolaji, 2022).

Nigeria's health statistics are disturbing, implying that the country is falling behind in terms of human development, as health is a critical component of it. Health facilities are performing below standards, leading to Nigerians having a lower life expectancy of 54 years compared to neighboring countries. Nigeria bears a significant burden of chronic and infectious diseases with infectious diseases being the leading cause of death, while non-communicable diseases account for 30% of the deaths (Akinyemi and Mobolaji, 2022).

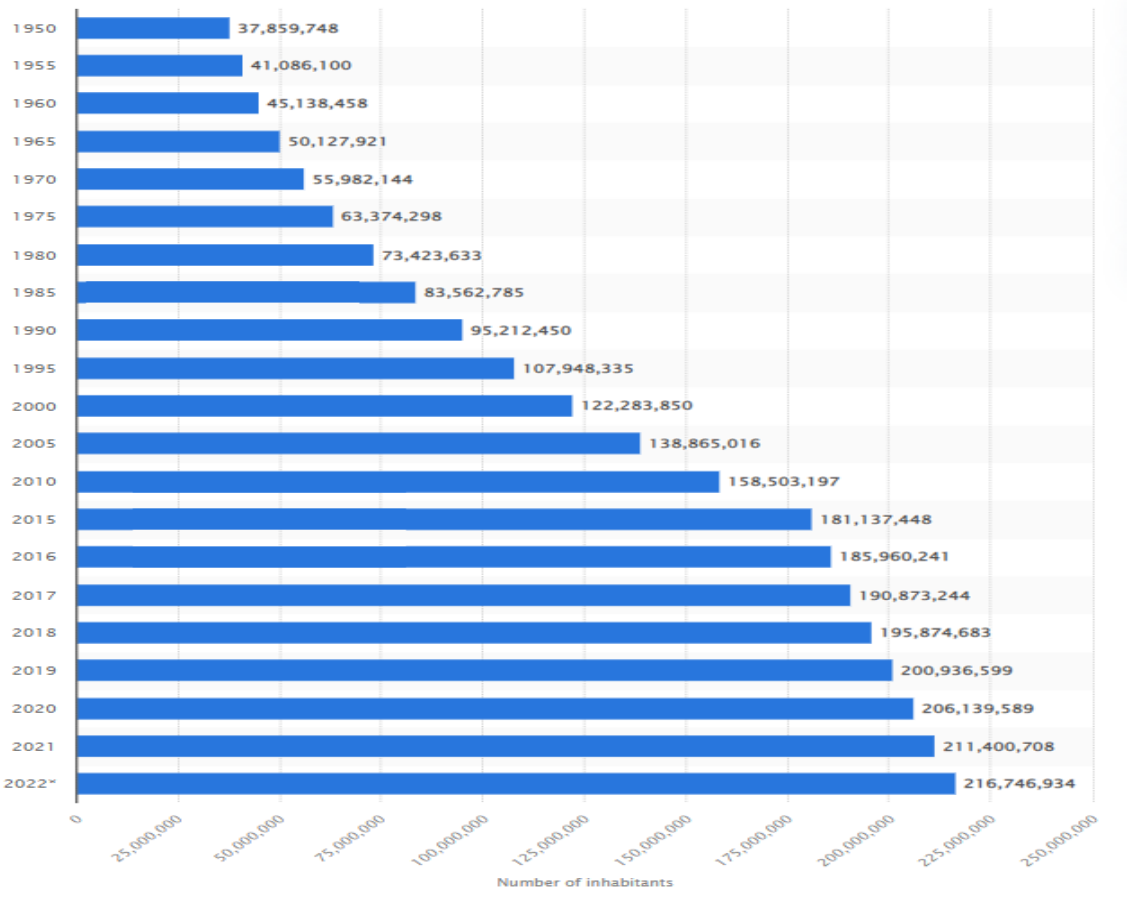

Figure 1: Nigeria's population from 1950 to 2022 (Statista, 2022a)

2.2 Pharmaceutical Industry of Nigeria

The pharmaceutical industry of a country plays a vital role in promoting the health of its citizens (Urias, 2017). The COVID-19 pandemic exposed Nigeria's limited pharmaceutical manufacturing capacity as the decreased importation led to shortages of drugs. This highlights the urgent need to strengthen the local production of pharmaceuticals (Akande-Sholabi *et al.*, 2020).

The Pharmaceutical Manufacturers Group of the Manufacturers Association of Nigeria (PMG-MAN) holds the view that Nigeria's pharmaceutical sector has the potential to lead Sub-Saharan Africa (Obukohwo *et al.*, 2018). Nonetheless, the country still grapples with poverty, disease, and malnutrition, despite her large population and vast natural resources. Regrettably, in 2000, Nigeria's health sector was rated 187th among the 191 member nations by WHO, due to the absence of required equipment for the manufacture and storage of pharmaceutical products (WHO, 2000).

Although Nigeria has more than 115 registered pharmaceutical manufacturers, the country continues to depend on imported pharmaceutical products mainly from India and China. Local pharmaceutical manufacturing of raw materials and finished products have not received adequate attention, leading to increased drug prices and foreign exchange difficulties (Okereke *et al.*, 2021). From 2014 to 2018, the cost of importing raw materials for pharmaceutical production increased by more than 100% due to the depreciation of the Naira and the rise in transportation costs. This combined with the unfavorable policies, high taxes, and poor infrastructure in the country makes local production of pharmaceutical products unattractive, thereby impeding the growth of the pharmaceutical manufacturing sector. Pharmaceutical companies may continue to increase their dependence on drug importation to avoid incurring excessive production costs which could continue to expose the country to the infiltration of counterfeit medicines into the lawful supply chain (Anudu, 2019; Okereke *et al.*, 2021).

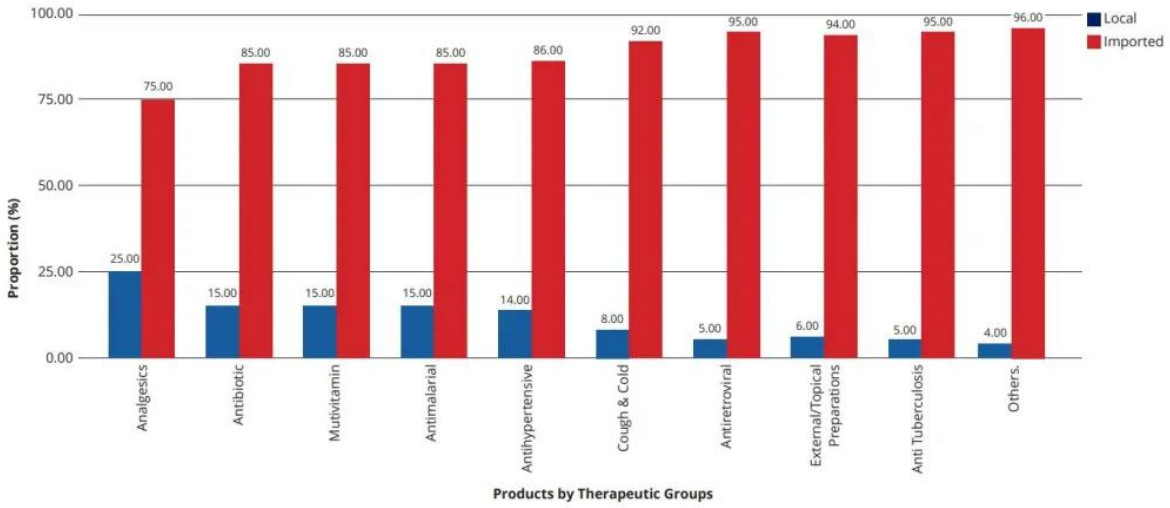

Figure 2: Proportion of drugs in Nigeria locally manufactured vs imported in 2016 (Spur, 2018)

2.3 Regulatory Authorities

The regulation of the Nigerian pharmaceutical industry is overseen by two agencies that fall under the Federal Ministry of Health: The Pharmacists Council of Nigeria (PCN) and the National Agency for Food and Drug Administration and Control (NAFDAC). PCN focuses specifically on the regulation of pharmacy practice in the country. It is responsible for various aspects of this regulation, including the registration and licensing of pharmacists, pharmacy technicians, and pharmacy premises in Nigeria. Furthermore, it is also tasked with the accreditation of pharmacy schools and training institutions, as well as establishing and enforcing standards for pharmacy practice, and ensuring that these standards are upheld (UNIDO, 2011).

NAFDAC, established by Decree 15 of 1993, is responsible for regulating foods, drugs, cosmetics, medical devices, and chemicals in Nigeria. Its primary objective is to ensure that these products are safe, effective, and of high quality to safeguard the health of Nigerians. The agency is also responsible for handling reports concerning counterfeit medicines and is involved in educating the public about their health risks and how to recognize and report such drugs (UNIDO, 2011).

2.4 Detecting and Reporting Counterfeit Medicines in Nigeria

Counterfeiting in Nigeria encompasses the production of medicines that lack active ingredients, those containing toxic components, expired drugs that have been relabeled, as well as those not registered with NAFDAC (Nneka and Olivia, 2020).

Nigerians can verify the authenticity of medicines at the point of purchase using two methods: the NAFDAC Registration Number (NRN) or the Mobile Authentication Service (MAS). All medicines sold in Nigeria must have a 6-digit NRN to demonstrate its safety for consumption. This number can be confirmed by typing it into the field provided on the link - http://nafdacverify.com.ng/. If the product is found to be unregistered, the client can file a complaint form with NAFDAC through the URL- https://www.nafdac.gov.ng/about-nafdac/contact-nafdac/complaints-and-enquiries/ (NAFDACverify, 2017; NAFDAC, 2017a).

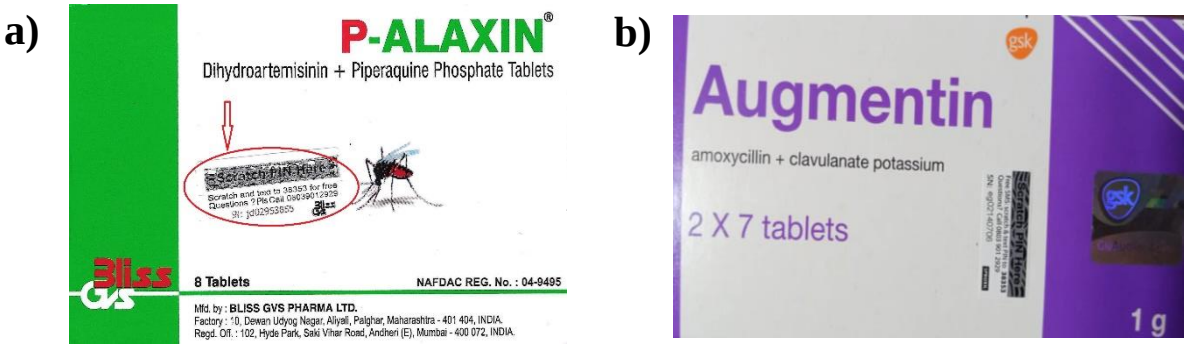

Figure 3: a) Antimalaria and b) Antibiotic with scratch pin for MAS verification (Bill, 2015; Rommar Pharmacy, 2021)

The MAS technology, introduced by NAFDAC in 2010, allows clients to verify the authenticity of medicines through their mobile phones. This service is provided free of charge and works by allowing clients to send the unique pin concealed in the scratch panel found on the product packaging to a designated number. The client will receive a text message indicating whether the product is genuine or suspected fake. This scheme applies to antimalarials and antibiotics imported or manufactured in the country (Oladosu *et al.*, 2016; NAFDAC, 2017b). If the drug is found to be a suspected fake, a complaint form can be submitted to NAFDAC through the same URL.

In both cases, NAFDAC will investigate the complaint, request additional information from the client if necessary, and take appropriate measures to confirm the authenticity of the medication. If the drug is found to be counterfeit, NAFDAC will arrest those responsible and remove the affected products from circulation. Clients can also choose to visit NAFDAC offices directly to file a complaint. This approach can also be used to report medicines with suspicious packaging and/or labelling information (NAFDACverify, 2017; NAFDAC, 2017a).

2.4.1 Limitations to the Techniques for Detecting Counterfeit Medicines in Nigeria

The major drawback of the counterfeit medicine detection methods in Nigeria is that counterfeiters can replicate and utilize both the NRN and MAS systems.

A study by Agbaraji *et al.* (2012) was conducted to compare the effectiveness of the serialization technique used in developed nations, such as the Radio Frequency Identification (RFID), with the MAS technology employed in developing countries. The serialization technique involved using an RFID tag with a unique identifier on each medicinal product that can be scanned in pharmacies and hospitals to verify its authenticity and track it throughout the supply chain. The study found that there was a higher incidence of counterfeit medicines in developing nations, specifically 60%, 50%, and 30% in Africa, Asia, and Latin America respectively, while developed countries in Europe and North America had lower rates of 3% and 2% respectively. This implied that the serialization technique was a more effective solution than the MAS technology. The study identified the limitations of the MAS technology such as the inability to track products with a unique pin throughout the supply chain and the likelihood of counterfeiters duplicating the pin. Thus, the study suggested that developing countries should prioritize the adoption of the serialization technique, which has been instrumental in reducing counterfeit medicines in developed nations.

Furthermore, the study by Oladosu *et al.* (2016) revealed that counterfeiters are able to clone both systems, NRN and MAS, and distribute counterfeit products that would produce the same genuine confirmation as the original products when verified by consumers.

As Nigeria endeavors to adopt the advanced drug anticounterfeiting technologies, its consumers and healthcare professionals are encouraged to make use of the current system and pay close attention to the appearance, packaging, and labelling of all purchased medicines. Any medicines suspected to be counterfeit should be reported to the regulatory authorities for thorough investigation.

2.5 Awareness of Consumers and Pharmacists Regarding the Presence of Counterfeit Medicines in Nigeria

There is a lack of sufficient research on the knowledge of consumers and pharmacists regarding the presence of counterfeit drugs in Nigeria and their related health implications. To address this knowledge gap, the researcher examined studies from other countries where counterfeit medicines were common to explore the perceptions of these two groups in those countries regarding such drugs. The findings revealed that both consumers and pharmacists were highly aware of the existence of such drugs in their countries and their associated health risks.

Consumers' Awareness

A study was conducted by Nneka and Olivia (2020) to investigate the awareness of Nigerian consumers regarding counterfeit medicines and substandard food products in the country. Data

was collected from 580 participants using a questionnaire survey. The study found that all participants (100%) were aware of the existence of counterfeit medicines in Nigeria, with NAFDAC media campaign being their main source of information. The majority of the participants (87%) had knowledge of the dangers associated with consuming such products, indicating a high level of awareness among consumers about the presence of these drugs in the country and the associated health risks. The research indicated that the affordability of counterfeit drugs was the main reason for their presence in Nigeria, rather than consumer's lack of knowledge about these products or the dangers they pose. Moreover, consumer's inability to differentiate between genuine and fake drugs was identified as another contributing factor, as counterfeit products are designed to look identical to the original drugs.

The findings of this research were consistent with the study conducted by Sholy and Saliba (2018), which evaluated the awareness and experience of the Lebanese population regarding counterfeit medicines. The study gathered data from 849 participants using a questionnaire survey administered in various parts of Lebanon. The results of the study showed that the majority of the respondents (93.4%) were aware of the existence of counterfeit drugs, and 84.4% cited television as their primary source of information. A significant proportion of the respondents (80.5%) recognized the dangers associated with counterfeit medicines. The study revealed that the public had a good understanding of the prevalence of counterfeit medicines in the country and their associated health risks. Additionally, the study confirmed that the lack of availability and affordability of genuine medicines were significant factors contributing to the purchase of counterfeit medicines.

Finally, the research conducted by Mhando et al. (2016) in Tanzania, which included 293 participants, also demonstrated a high level of awareness among the public regarding the high occurrence of counterfeit drugs in their country. The study also revealed that a significant number of participants were unable to distinguish between counterfeit and genuine drugs based on simple observations such as the appearance of the drugs, packaging, and labelling information. The study suggested empowering the public to identify counterfeit drugs using these visual inspection techniques as a crucial step in discouraging the market for such products.

Pharmacists' Awareness

A study by Adigwe *et al.* (2022) was conducted to assess the knowledge and practices of pharmacists in Nigeria with regards to counterfeit medicines and the challenges in reducing their circulation in the country. The study gathered data from 390 pharmacists practicing in various fields of pharmacy. The findings showed that most participants had a good understanding of

counterfeit medicines and their dangers, as expected from their professional background. However, a significant number of participants (30.7%) felt that their knowledge and skills were insufficient to detect counterfeit medicines. Although this group was in the minority, the subject's importance made the finding significant. The study suggested the provision of continuous development programs to enhance pharmacist's knowledge of counterfeit detection to better protect public health in Nigeria.

The research findings were in line with the study carried out by Wagiella *et al.* (2020) in Sudan. The study surveyed 229 community pharmacists and found that they were cognizant of the prevalence of counterfeit drugs in the market. The study identified several factors that contributed to the spread of counterfeit drugs, including drug scarcity, insufficient regulatory oversight, profitability of counterfeit drugs, and the high cost of genuine medications. These factors were also accountable for the presence of such medicines in Nigeria.

In summary, there is a scarcity of research conducted in countries facing the issue of counterfeit medicines that has examined the awareness of consumers and pharmacists regarding the existence of such drugs and their possible health risks. Nonetheless, the studies discussed in this research demonstrated a significant level of awareness among these two groups regarding the existence of counterfeit drugs in countries where they are prevalent.

2.6 Attitude of Consumers and Pharmacists Toward Reporting Counterfeit Medicines

There are also few studies that have investigated the attitude of consumers and pharmacists in Nigeria toward reporting counterfeit medicines, and the reasons behind such behaviors are not well understood. This research aims to address this knowledge gap by incorporating studies from other countries where counterfeit medicines are also a problem, to gain a general understanding of the reporting behavior of the two groups and their underlying reasons.

Consumers' Attitude

Two studies were identified that investigated this subject matter. The first study, conducted by Binkowska-Bury *et al.* (2013) in Poland, examined the knowledge of physicians, nurses, and the public about counterfeit medicines. The study found that counterfeit medicines were largely underreported by these groups, as majority of them were unaware of the reporting process and the importance of reporting such drugs. The research recommended providing education to health professionals and the public about the process of reporting and the importance of reporting counterfeit medicines.

The second study conducted in Lebanon supported these findings, highlighting that consumers underreported counterfeit medicines due to the absence of a counterfeit medicine reporting system in the country (Sholy and Saliba, 2018).

In contrast to the previous study, Nigeria already has a reporting system for counterfeit medicine in place. Therefore, in addition to exploring the attitudes of consumers and pharmacists in Lagos towards reporting such medicines, the researcher would also investigate if these groups were aware of the reporting process and the importance of reporting such drugs.

Pharmacists' Attitude

The research conducted by Odili *et al.* (2006) investigated how community pharmacists in Lagos detected counterfeit medicines and what actions they took upon discovering them. The study utilized a questionnaire survey to gather data from 69 community pharmacists. The results showed that majority of the participants (65.2%) chose to return the counterfeit medicines to the supplier when detected, while only a small percentage (18.8%) reported such products to NAFDAC. Such conduct is worrying as it could impede the prosecution of counterfeiters and lead to the re-circulation of these products. The primary reasons identified for this behavior was due to the fear of losing the invested capital in purchasing the suspected counterfeit products by reporting or destroying them and the lack of confidence in NAFDAC's ability to control the spread of these products.

Furthermore, a study carried out in Lebanon investigated the opinions of pharmacists towards counterfeit medicines and collected data from 223 pharmacists across different regions in the country using questionnaires. Findings from the research indicated that a significant proportion of the participants (43%) acknowledged being aware of pharmacists who dispensed counterfeit medicines but refrained from reporting them to the authorities due to this not being part of their culture. Despite this, such pharmacists were regarded as unprofessional and unethical, and it was suggested that they face consequences for their actions (Sholy *et al.*, 2018). However, this behavior raises the question of how the regulatory authorities would appropriately penalize such pharmacists if they cannot be identified.

This conduct might indicate that they fear the repercussions they might face if identified as the informant. It would be crucial to examine if this factor also influences the willingness of consumers and pharmacists in Lagos to report counterfeit medicines. In any case, pharmacists should be motivated to act against pharmacists or individuals involved in the distribution or sale of counterfeit medicines.

To summarize, the studies discussed earlier revealed that counterfeit medicines were largely underreported by consumers and pharmacists in different regions due to the reasons identified. Therefore, the researcher aimed to investigate whether these reasons also influenced the behaviors of these groups in Lagos with the aim of providing solutions highlighted in these studies to resolve them.

2.7 Challenges faced by consumers and pharmacists towards reporting counterfeit medicines in Nigeria

To the best of the researcher's knowledge, there is no existing study that has investigated the challenges Nigerian consumers and pharmacists encounter in reporting counterfeit medicines to NAFDAC. This study seeks to fill this gap in knowledge and serve as a basis for future research in this area. To examine these challenges, the researcher first identified the obstacles from the studies discussed earlier on the awareness and attitudes of consumers and pharmacists in different regions of the world, and proposed solutions to address them.

The challenges identified in the literature review that influenced the behaviors of consumers and pharmacists with regards to reporting counterfeit medicines include difficulty in identifying such medicines, fear of losing the money invested in purchasing the medicines, lack of confidence in the regulatory authorities' efforts to combat the issue, lack of knowledge on how to report such medicines to the regulatory authorities, fear of consequences if identified as the informant, past experiences of inaction after reporting, and lack of understanding of the importance of reporting such medicines.

The researcher intends to investigate these challenges to determine if both groups were affected to the same extent. Additionally, the proposed solutions will be presented to participants to gauge their opinions. These recommendations include regular training for the public and pharmacist on how to identify and report counterfeit medicines, establishment of a system for reimbursing individuals who report counterfeit medicines to the regulatory authority, keeping the identity of informants anonymous, providing regular updates to consumers and pharmacists on the status of their reports and investigations, and sponsoring awareness campaigns to educate consumers and pharmacists on the importance of reporting counterfeit medicines.

2.8 Conclusion

In conclusion, very few studies have addressed the awareness, attitude and challenges of consumers and pharmacists regarding reporting counterfeit medicines to the regulatory authorities. This study seeks to fill this gap and present recommendations that will improve reporting rates and reduce the presence of such products in Lagos, and Nigeria as a whole.

2.9 Conceptual Frame work

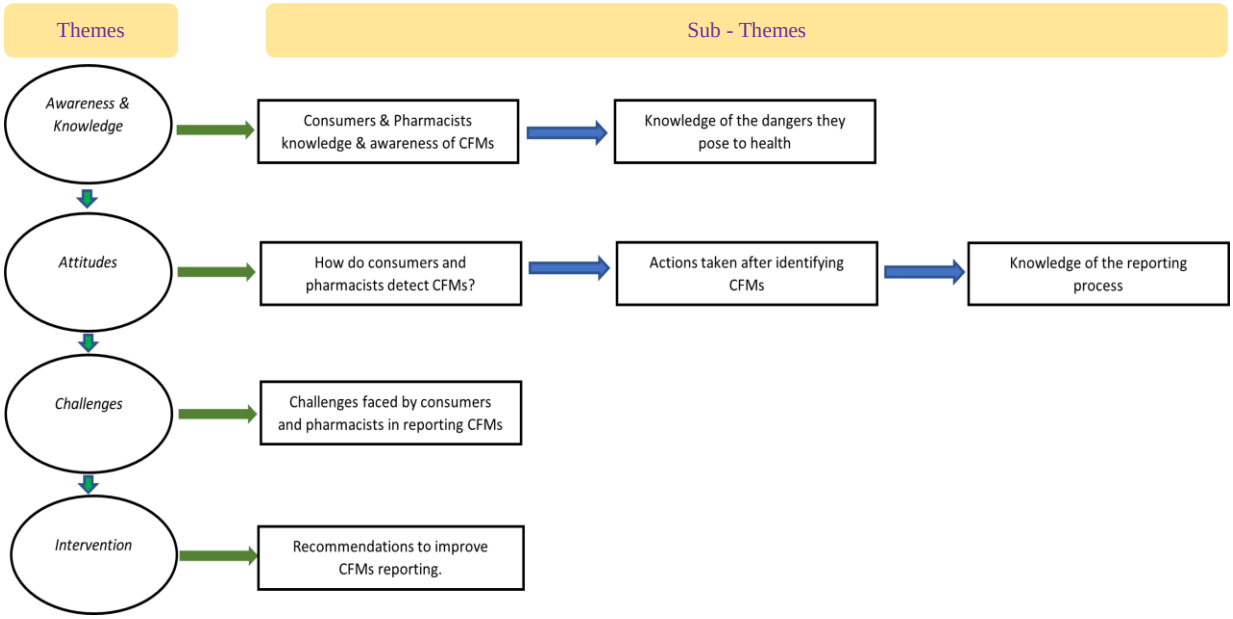

Figure 4: Research conceptual framework, created by author

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Overview

Table 1: Primary Data collection

	Primary Data	**Part A**	**Part B**
1	Methodology	Quantitative	Qualitative
2	Philosophy	Positivism	Interpretivism
3	Data collection source	Highly structured questionnaire	Semi-structured phone interview
4	Structure	5 sections comprised of 17 questions	Phone conversation of 15-30 minutes
5	Sampling technique	Random sampling	Purposive/ snowballing sampling
6	Subjects	Registered pharmacists in Lagos (126) Consumers in Lagos (182)	Registered pharmacists in Lagos with ≥ 10 years practice experience (8)

3.2 Participants Profile

The participants of this study consisted of pharmacists and consumers residing in Lagos during the study period. Consumers in this research refer to individuals in Lagos who are 18 years or older and have used medicines to address their health needs. This group of consumers comprises a broad range of professions, including but not limited to teachers, accountants, lawyers, engineers, artists, students, and drivers. The inclusion of consumers in this study is crucial as they are often the first to use medication and can report any discrepancies in packaging and labelling information or unexpected side effects. Such reports are essential to the regulatory authority in identifying the producers and distributors of such medicines.

The profile of pharmacists involved in this study includes those who are registered and working in different fields of pharmacy practice such as community practice, hospital practice, regulation, academics, industry, and other relevant areas. Pharmacists are also a key focus of this study due to their crucial role in the drug supply chain, and their expertise in medication can aid in identifying potential counterfeit drugs by detecting any inconsistencies in packaging, labelling, or active ingredients. By reporting such findings, pharmacists can assist regulatory authorities in taking swift action to halt the distribution and sale of counterfeit medicines.

3.3 Research Approach

To determine the attitude and challenges of consumers and pharmacists in Lagos regarding reporting counterfeit medicines, the researcher employed a combination of quantitative and qualitative research methods, by using questionnaire surveys and phone interviews respectively.

The researcher distributed an electronic survey to consumers and pharmacists in Lagos to obtain their responses to the survey questions. This allowed the researcher to collect relevant and suitable data for statistical analysis. The survey questions aimed to determine the level of awareness among the public and pharmacists in Lagos regarding the presence of counterfeit medicines in the Nigerian market, their readiness to report such products, the difficulties they face in reporting them, and suggestions to overcome these challenges. By exploring the similarities and differences in the perspectives of both groups, the researcher was able to propose recommendations sustainable over the long run.

To collect qualitative data, the researcher interviewed eight highly experienced pharmacists in Lagos, defined as pharmacists with 10 or more years of practice experience, via telephone. The purpose of the interview was to obtain their personal perspectives on the reporting of counterfeit medicines, with a focus on the attitude of pharmacists in Lagos toward reporting these medicines, the challenges they encounter when reporting them, and suggestions for overcoming these obstacles.

The researcher opted not to gather qualitative data from the public in Lagos due to the challenge of selecting a consumer group that accurately represents the wider population. As a result, conducting interviews with consumers would not have been an efficient method for obtaining a representative sample in this study. Instead, the researcher relied solely on surveys as a more effective and efficient way to gather information from a diverse and larger group of people. This approach enabled the researcher to collect more data and achieve a more comprehensive understanding of the subject matter.

This study was conducted in Lagos State because it is the most populated state in Nigeria and contains one of the largest drug markets in the country, namely the Idumota market. The interventions proposed in this study are transferable to other States as a means of reducing the prevalence of counterfeit medicines across the country.

3.4 Sample Size Calculation

The Sample size for this study was calculated using the formula outlined in Figure 5

$$\text{Sample size} = \frac{\frac{z^2 \times p\,(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p\,(1-p)}{e^2 N}\right)}$$

Figure 5: Sample size formula (Survey Monkey, 2023)

Where N = Population size, e = Margin of error (percentage in decimal form),

z (z-score) = **1.96** for a 95% Confidence Interval;

p (Standard deviation) = **0.5** (to ensure sample size is large enough)

3.4.1 Sample Size Calculation for Consumers in Lagos

Lagos has a population of approximately 16 million people (Statista, 2022b). At the start of the research, the researcher had a goal of reaching a sample size of 385 individuals, which was calculated based on the formula outlined in Figure 5, using a 95% Confidence Interval and a 5% margin of error. However, the researcher faced a challenge during the study as the participants exhibited a low response rate, citing reasons such as time constraints and apprehension about sharing their opinions with an unfamiliar person, despite the assurance of anonymity and confidentiality. To overcome this hurdle of attaining a larger population for the survey, the researcher increased the margin of error to 8%, while still maintaining a 95% Confidence Interval, resulting in a reduced target sample size of 151 participants. The researcher ultimately recruited 182 consumers for the study, allowing for the results to be generalizable to the consumer population in Lagos.

3.4.2 Sample Size Calculation for Pharmacists in Lagos

There are approximately 3700 registered pharmacists practicing in Lagos (Ekpenyong *et al.*, 2018). Initially, the researcher aimed to attain a sample size of 349 pharmacists by utilizing a 5% margin of error and a 95% Confidence Interval. However, due to the challenges faced in accessing this number of pharmacists, as discussed in the consumer sample size, the researcher opted to raise the margin of error from 5% to 8% while still maintaining a 95% Confidence Interval to conduct a more realistic study. This resulted in a revised target sample size of 145 registered pharmacists in Lagos. The study eventually recruited 126 pharmacists, which although below the target, is still a valid and generalizable sample of the pharmacist population in Lagos as the researcher employed random sampling and maintained a 95% confidence interval.

3.5 Research Philosophy

The underlying philosophies guiding this study are positivism and interpretivism, which were utilized to analyze the data gathered from participants and present an appropriate conclusion to the research undertaken.

The study employed the positivism approach by utilizing a well-structured questionnaire survey that was electronically distributed to both consumers and pharmacists in Lagos. The purpose was to gather data for statistical analysis to arrive at a suitable conclusion regarding their attitude

toward reporting counterfeit medicines, as well as the obstacles encountered by both groups in reporting such medications. The use of an online survey ensured that the researcher was independent of the study, enabling the participants to provide their views without any biases or reservations that may occur in the researcher's presence.

The interpretivism philosophy involved collecting qualitative data through phone call interviews with experienced pharmacists and analyzing the data using thematic analysis. This allowed the researcher to gain insight into the subjective perspectives and experiences of the participants on the subject matter and interpret their meanings to draw an appropriate conclusion on the study.

3.6 Research strategy

The strategy of this research involved assessing the knowledge of pharmacists and the public in Lagos regarding the existence of counterfeit medicines in the Nigerian market, their willingness to report such products and the obstacles that hinder them from reporting effectively. Previous studies have shown that these groups have high awareness about such products. However, no previous research has investigated the challenges that these groups encounter when reporting these medicines. The current study seeks to not only confirm the findings of previous research on the awareness of both groups but also address the gaps in knowledge on the challenges they face when reporting such drugs.

3.7 Primary Data Collection

Primary data in this research were collected using questionnaire survey and phone call interview. Two sets of questionnaires were created using Microsoft Forms and were disseminated online to both consumers and pharmacists in Lagos. The consumer questionnaire comprised 17 questions while the pharmacist questionnaire comprised 18 questions. Both questionnaires included an introductory letter that provided information about the study and its objectives. The letter also assured participants that their responses would remain completely confidential and anonymous. The first question on each questionnaire was designed to obtain consent from participants for the use of their responses in the study.

The two questionnaires were structured into 5 sections to achieve the research objectives. Section 1 focused on demographics and aimed to collect information such as age, level of education, and occupation from consumers, as well as length and area of pharmacy practice from pharmacists. Section 2 aimed to assess the knowledge of both groups on counterfeit medicines, including their existence in Nigeria and the source of their information. Section 3 aimed to evaluate the attitude of both groups toward reporting counterfeit medicines by assessing whether they had encountered such products and the actions taken after identifying them. Section 4 consisted of questions designed to determine the perception of both groups about the factors that limit the

reporting of counterfeit medicines in Lagos. Lastly, Section 5 aimed to obtain the opinion of participants on provided recommendations for improving counterfeit medicine reporting in Lagos.

In this study, phone call interviews were conducted with highly experienced pharmacists to obtain in-depth insights into the subject matter. Prior to the interviews, the participants were provided with an information letter detailing the study's purpose, the reason for their selection, and the interview process. Along with the information letter, they also received an informed consent form, which they had to sign, granting permission for the use of data obtained from the interview in the research. Open-ended questions were employed to allow the researcher capture detailed information from participants aligning with the study's objectives. Two pilot interviews were conducted with pharmacists who matched the target participants to identify and resolve any potential issues with the interview questions or process before the main data collection began. This allowed the researcher to modify the research questions and ensure that the necessary information was obtained during the main interviews.

3.8 Access to Study Participants

Accessing Consumers in Lagos

Between March 20, 2023, and April 16, 2023, the researcher collected data from 182 consumers in Lagos using a questionnaire survey distributed via WhatsApp and Email. To minimize biases and enhance the generalizability of the results to members of the public of Lagos, a random sampling technique was used to select participants. The researcher also sought the assistance of family and friends in recruiting eligible participants.

Accessing Pharmacists in Lagos

Between March 20, 2023, and April 16, 2023, the researcher collected data from 126 registered pharmacists practicing in Lagos. Using LinkedIn, the researcher sent out 500 connection requests to pharmacists who met the inclusion criteria, inviting them to participate in the study. The questionnaire was then distributed to the 190 respondents who accepted the connection, and 126 of them completed it. To ensure the generalizability of the results to the population of pharmacists practicing in Lagos, a random sampling technique was employed.

To obtain reliable and crucial information required to accomplish the research objective, the researcher conducted qualitative interviews with eight highly experienced pharmacists, four of whom were in community practice and the other four in hospital practice. The researcher employed purposive and snowballing sampling techniques to reach this specific target population.

3.9 Ethical Consideration

The researcher provided a concise explanation of the study to the survey and interview participants, along with informing them that it was a requirement for a Masters degree in Pharmaceutical Business and Technology.

The questionnaire and interview questions were structured with caution to avoid requesting personal information from the respondents and to ensure that they were strictly relevant to the research objectives. Participants were informed that the study was voluntary, and they could withdraw at any time. Informed consent was also obtained from all participants prior to their involvement in the study, and they were assured that their identity would remain completely anonymous and confidential.

Participants were informed prior to the interview that it would be recorded, and their consent was obtained. The researcher conducted the interview in a professional and ethical manner, ensuring that respondents were not subjected to any harm or embarrassment. All data collected from participants in this study was treated with the utmost confidentiality and anonymity.

3.10 Data Analysis

The data gathered from the questionnaire survey were analyzed using Microsoft Excel, and the findings were illustrated using tables, pie and bar charts. Additionally, statistical analysis using independent sample t-test was conducted to determine whether consumers and pharmacists in Lagos encountered similar difficulties when reporting counterfeit medicines.

For the qualitative data, thematic analysis was performed on the data obtained through phone interviews. Each recognized theme was assigned a code to establish connections between topics. The themes identified were presented and supported with participants' responses.

3.11 Inclusion and Exclusion Criteria

The inclusion criteria for the questionnaire survey were registered pharmacists practicing in the different fields of pharmacy in Lagos, and individuals who were 18 years or older, residing in Lagos during the study period, and have used medicines to address their health needs. Those who did not meet the inclusion criteria or met the criteria but declined to respond to the questionnaire were excluded from the study.

The survey questionnaire included a brief study explanation, and participants had to answer the first question before proceeding. This question requested their informed consent for the use of their responses for the study's purpose. The decision to participate or withdraw from the study rested entirely with the participants. By completing the survey, participants indicated their

voluntary participation. Individuals who declined to participate were advised to ignore the survey link.

The inclusion criteria for collecting qualitative data through phone call interviews specified pharmacists in Lagos with ten or more years of practice experience. Those who had less than ten years of experience or declined to participate in the interview were excluded.

3.12 Conclusion

The researcher utilized a mixed method approach in this study to gather data, which was influenced by both positivism and interpretivism philosophies. This approach involved the collection of quantitative data through an online survey and qualitative data through semi-structured phone interviews. By employing this method, the researcher gained a more comprehensive understanding of the research study. The next chapter contains a presentation and analysis of the data gathered from respondents.

CHAPTER 4: FINDINGS AND ANALYSIS

4.1 Overview

In this chapter, a thorough assessment was provided of the data collected during the research process. The insights obtained from the data allowed the researcher to gain a better understanding of the subject matter and present an appropriate conclusion to the study.

The researcher began by analyzing the quantitative data collected from consumers and subsequently proceeded to analyze both the quantitative and qualitative data acquired from pharmacists practicing in diverse fields of pharmacy in Lagos, Nigeria.

4.2 Analysis of Consumers' Responses

Response Rate: The survey was administered to a total of 250 consumers over the course of 28 days (from March 20th to April 16th, 2023). Of those, 182 responses were received, resulting in a response rate of 72.8%.

4.2.1 Consumers' Demographics (Questions 2-6)

Table 2 presents the demographic characteristics of consumers who took part in the study. The results showed that 41.8% of the participants were male, 57.1% were female, and 1.1% did not disclose their gender. A significant proportion of the participants (70.3%) were young adults between the ages of 18-30 years, while 25.3% were aged 31-40 years, 3.8% were aged 41-50 years, and only 0.6% were aged 51 years and above. All participants had received a formal education, with the majority (58.8%) being postgraduates, 35.7% undergraduates, and only 5.5% high school graduates.

The majority of the participants (45.1%) were employed in corporate or office settings, with 30.2% being students, 14.3% being self-employed, and 7.7% being academic professionals. Only 2.7% of the participants were unemployed. Furthermore, 56.6% of the participants had resided in Lagos for at least 5 years, while 11% had lived in the state for a duration between 2 to 5 years. Additionally, 9.9% of the participants had been residents for a period between 1 to 2 years, and 22.5% had been in Lagos for less than a year.

Table 2: Consumer Demographics

Question	**Options**	**Responses (N)**	**Responses (%)**
Gender	Male	76	41.8
	Female	104	57.1
	Prefer not to say	2	1.1
	Total	*182*	*100*
Age	18-30 years	128	70.3
	31-40 years	46	25.3
	41-50 years	7	3.8
	51 years & older	1	0.6

	Total	*182*	*100*
What is your highest level of education?	No formal education	0	0
	High School	10	5.5
	Undergraduate	65	35.7
	Postgraduate	107	58.8
	Total	*182*	*100*
What is your occupation?	Student	55	30.2
	Academic professional	14	7.7
	Self-employed	26	14.3
	Corporate/office worker	82	45.1
	Unemployed	5	2.7
	Total	*182*	*100*
How long have you been resident in Lagos, Nigeria?	Less than a year	41	22.5
	1-2 years	18	9.9
	2-5 years	20	11.0
	5 years and above	103	56.6
	Total	*182*	*100*

4.2.2 Consumers' Awareness of Counterfeit Medicines (Questions 7-10)

In this section, the researcher presented the consumers' knowledge of counterfeit medicines and their presence in Nigeria.

Question 7:

This question assessed whether consumers in Lagos were aware of the presence of counterfeit medicines in Nigeria. From the findings, 94% of the participants (171 consumers) responded positively, while only 6% (11 consumers) indicated a lack of awareness, as shown in Figure 6. These results suggest a high level of public awareness in Lagos concerning the presence of counterfeit medicines in the country.

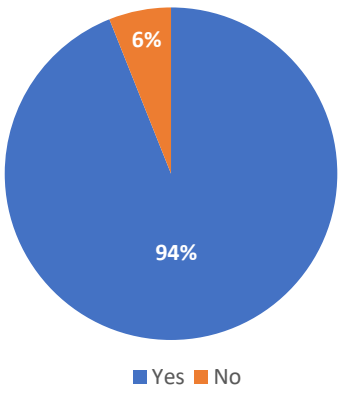

Figure 6: Consumers' knowledge of the presence of counterfeit medicine in Nigeria

Question 8:

As a follow-up to question 7, this question aimed to identify the sources of knowledge that consumers relied on to obtain information about counterfeit medicines in Nigeria. Results, as shown in Figure 7, revealed that the media was the most popular source of information, selected by 130 people, indicating its effectiveness in disseminating information about counterfeit medicines. Healthcare professionals were also a significant source of information, chosen by 107 people, highlighting their crucial role in educating the public about counterfeit medicines and their potential dangers.

Drug campaigns were also useful in educating the public, with 82 people selecting it as their source of information. Additionally, 81 people relied on "Family/Friends" as a source of information, highlighting the importance of social networks in spreading awareness about counterfeit medicines. The survey results also revealed that only 7 people did not know that counterfeit medicines exist in Nigeria, suggesting a relatively high level of public awareness and the success of efforts to educate the public about this issue.

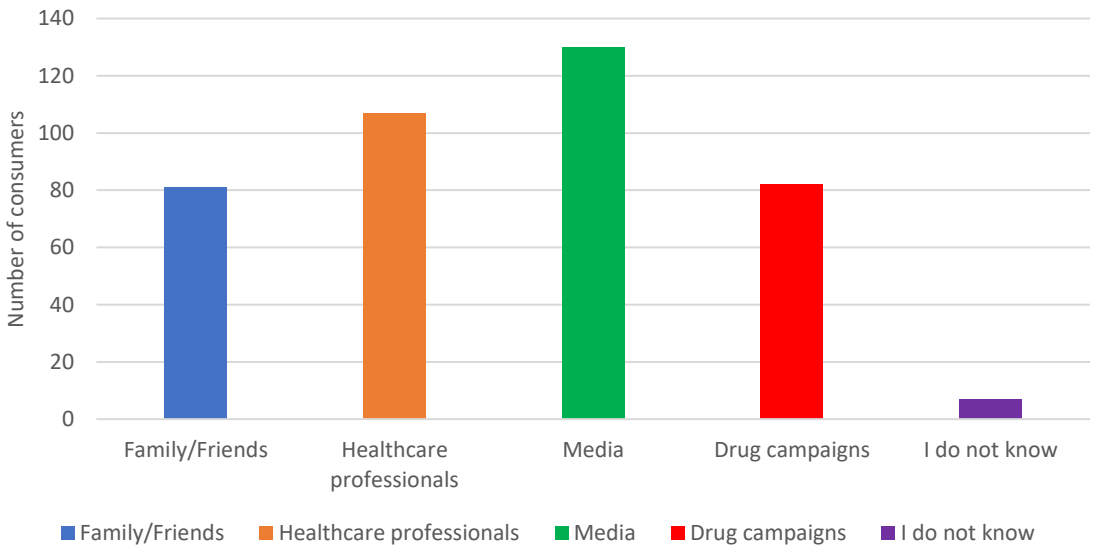

Figure 7: Consumers' source of knowledge for counterfeit medicines

Question 9:

Figure 8 provides information about the different ways consumers in Lagos define counterfeit medicines. The results indicate that most respondents (145 consumers) defined counterfeit medicines as drugs made to deceive people, while a significant number of respondents focused on the content of such medicines, including lack of active substance (111 consumers), inappropriate amount (106 consumers), and low-quality ingredients (102 consumers). Only 4 consumers indicated that they did not know how to define counterfeit medicines. These findings

suggest that the majority of the general public in Lagos has a basic understanding of counterfeit medicines.

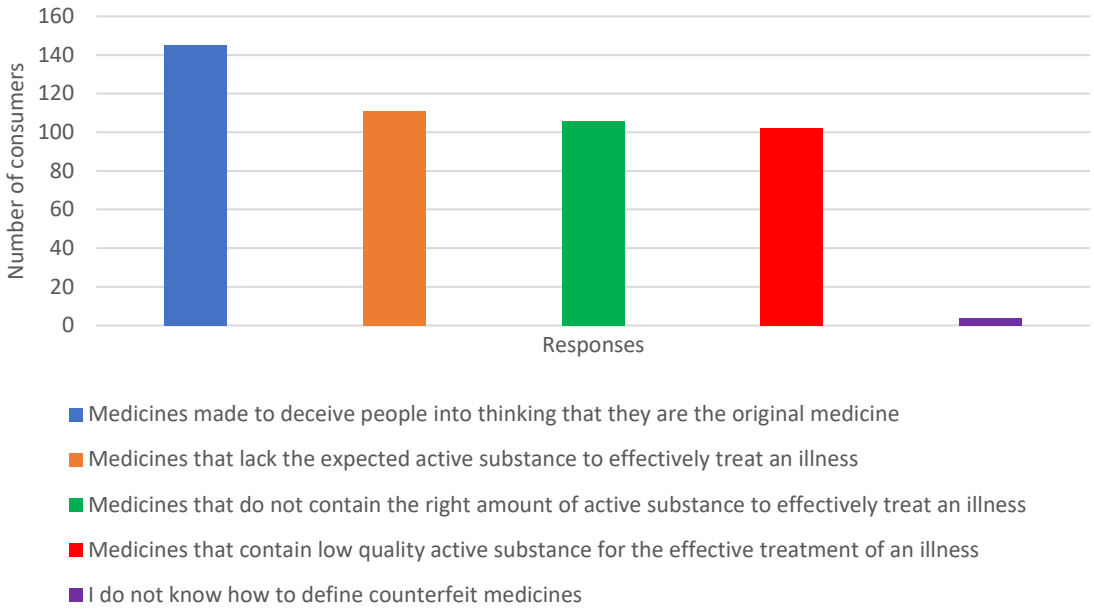

Figure 8: Consumers' definition of counterfeit medicines

Question 10:

In this question, consumers were requested to select all options that identified the risks of counterfeit medicines. The results, as shown in Figure 9, demonstrated that most of the respondents recognized treatment failure (157), adverse reactions (152), and death (156) as potential dangers of counterfeit medicines. Furthermore, 94 consumers identified antimicrobial resistance as a risk, and a significant number of respondents (130) also acknowledged prolonged recovery time as a potential danger. Only a small group of consumers (6) lacked knowledge about the risks of counterfeit medicines. These findings suggest that the public in Lagos is well-informed about the potential dangers of counterfeit medicines.

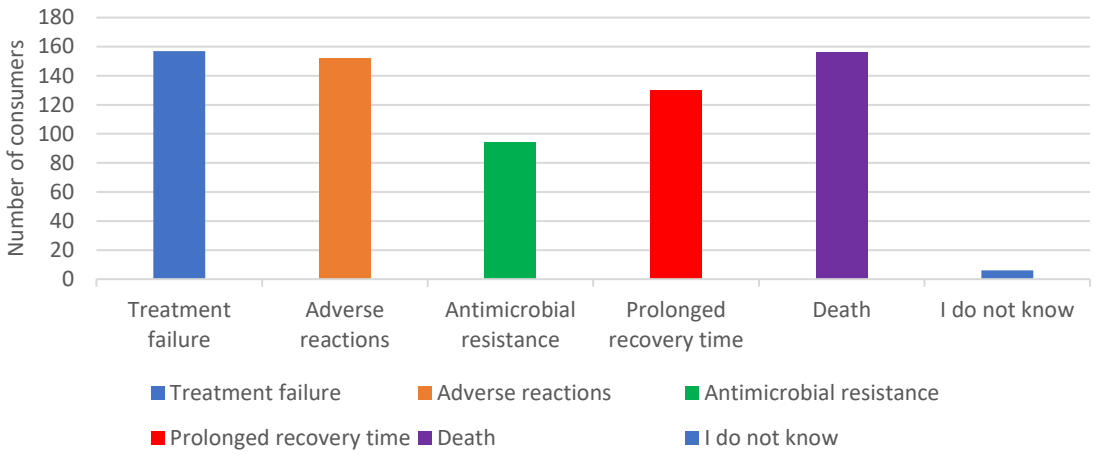

Figure 9: Consumers' Responses to the Risk of Counterfeit Medicines

4.2.3 Consumers' Attitude Toward Reporting Counterfeit Medicines (Questions 11-16)

Question 11:

In this question, consumers were asked to identify the organization responsible for handling reports of counterfeit medicines in Nigeria. 158 participants (86.8%) correctly identified the National Agency for Food and Drug Administration and Control (NAFDAC) as the responsible organization. Only 8 participants (4.4%) selected the Pharmacists Council of Nigeria (PCN), and 2 participants (1.1%) selected the World Health Organization (WHO) as the responsible organization. 14 participants (7.7%) indicated that they did not know which organization was responsible. Overall, these findings suggest that while there is some level of awareness among the public in Lagos regarding the responsible organization there is still some confusion and uncertainty among some members of the public.

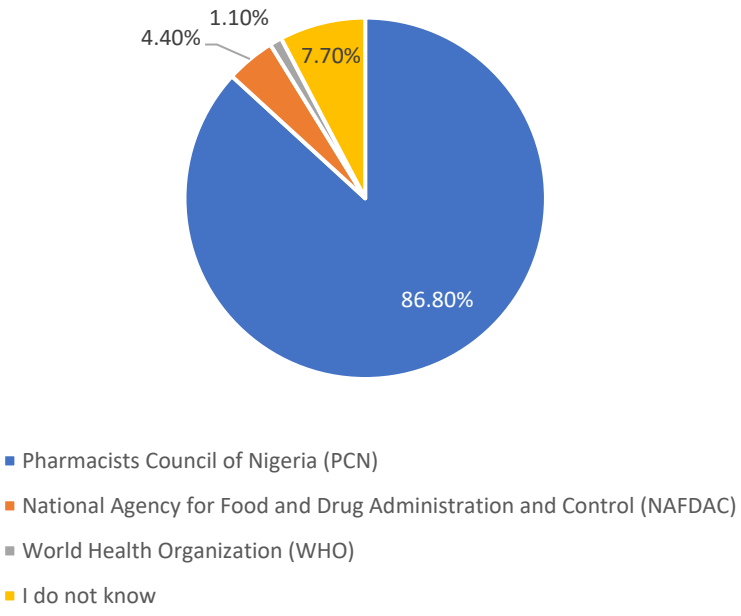

Figure 10: Consumers' Response to Counterfeit Medicine Reporting Organization

Questions 12:

This question asked consumers if they had ever encountered counterfeit medicines, and the results showed that 84 participants (46.2%) had encountered counterfeit medicines, while 98 participants (53.8%) had not. It is worth noting that a significant number of participants reported not encountering counterfeit medicines, which could imply that they may have encountered such drugs unknowingly, possibly due to the challenge in detecting counterfeit medicines.

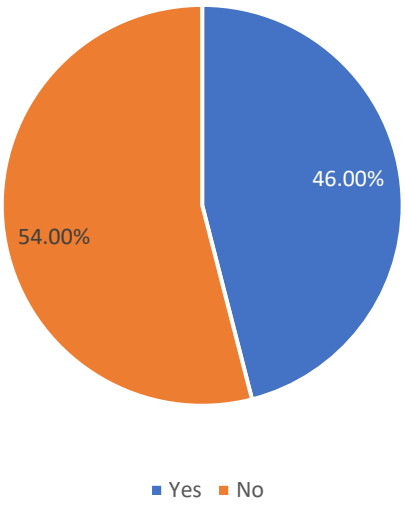

Figure 11: Consumers' Encounter with Counterfeit Medicines

Question 13:

Following the previous question, participants who reported encountering counterfeit medicines were asked to choose the methods they used to identify them. The results, presented in Figure 12, revealed that the primary way consumers identified counterfeit medicines was through the packaging appearance, with 72 participants selecting this option. Moreover, 58 consumers identified it based on the appearance of the medicine, and 53 based on incorrect label information. A relatively smaller group of consumers, 37, based their identification on experiencing side effects after consuming the medicine.

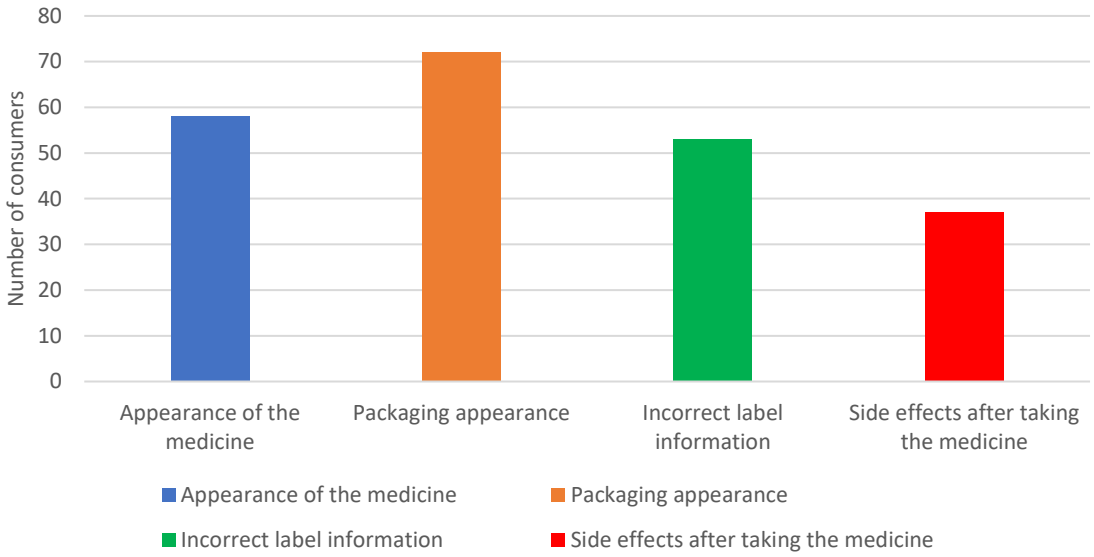

Figure 12: Consumers' Identification of Counterfeit Medicines

Question 14:

This question outlined the steps taken by consumers who encountered counterfeit medicines. The findings, in Figure 13, revealed that only a small number, 20 consumers (19%), reported the issue to the appropriate authority, while 11 consumers (11%) returned the medicine for a refund. The majority of respondents, 67 consumers (65%), disposed of the counterfeit medicines. The low number of consumers who reported such drugs is concerning because reporting is essential in identifying and addressing the problem of counterfeit medicines in Nigeria. Furthermore, it is alarming that a few consumers, specifically 5 individuals (5%), continued to use such medicines which could result in harmful consequences.

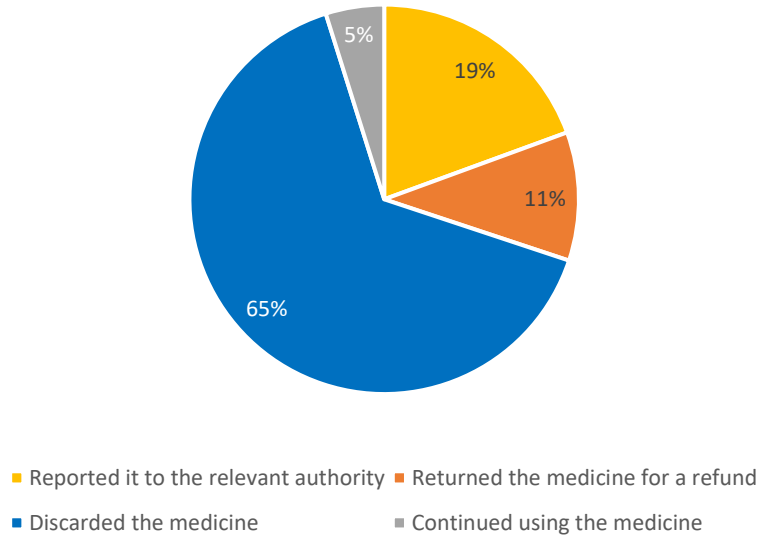

Figure 13: Actions taken by consumers after encountering counterfeit medicines

Questions 15 & 16:

In question 15, participants were asked about their opinion on the importance of reporting counterfeit medicines. Out of the total of 182 participants, 176 consumers (96.7%) agreed that it was crucial to report counterfeit medicines, while only 6 consumers (3.3%) answered that it was not important.

In question 16, participants were asked to choose their reasons for reporting counterfeit medicines. The results revealed that the public in Lagos was highly aware of the significance of reporting counterfeit medicines, with more than 75% selecting the correct reasons. Specifically, 164 consumers (90.1%) selected the need to protect public health as their reason, 164 consumers (91.2%) chose the need to prevent the further circulation of counterfeit medicines, 147 consumers (80.8%) wanted to contribute to the fight against counterfeit medicines, and 139 participants (76.4%) considered it essential to hold the manufacturers and distributors accountable. Only a negligible proportion of participants, 3 consumers (1.6%), did not believe that reporting counterfeit medicines was important.

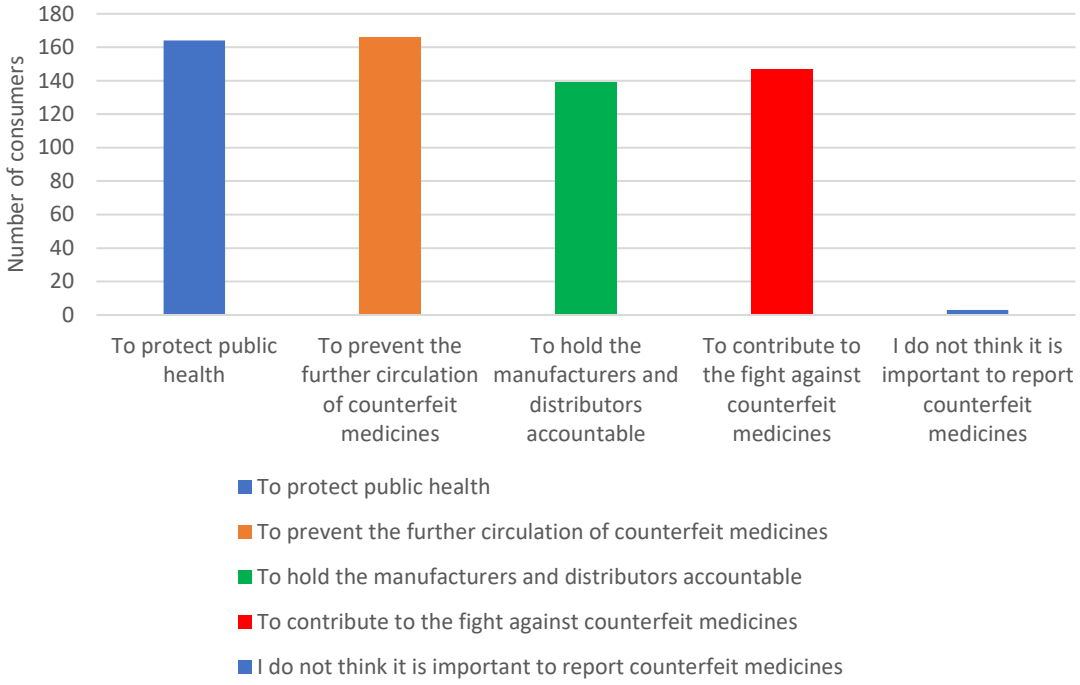

Figure 14: Consumers' Reasons for Reporting Counterfeit Medicines

4.2.4 Counterfeit Medicines Reporting – Consumers' Challenges (Questions 17i – vii)

To identify the challenges consumers face in reporting counterfeit medicines in Lagos, Nigeria, several options were provided to the respondents to gather their opinions on the subject matter.

A significant percentage (69.8%) of respondents agreed that it was challenging to identify counterfeit medicines, while 22% remained neutral, and 8.2% disagreed. This difficulty may be due to the sophistication of the counterfeiters or the resemblance of the counterfeit medicines to the original.

Interestingly, only a minority of the respondents (22.5%) agreed that fear of losing the money spent on purchasing the medicine was a challenge, with 25.3% being neutral, and 52.2% disagreeing. This finding could suggest that the cost of the medicine was not a significant factor in the decision to report counterfeit medicines among the public in Lagos.

However, the majority of respondents (69.8%) expressed a lack of confidence in the regulatory authority's efforts to combat counterfeit medicines, with 20.3% remaining neutral, and only 9.9% disagreeing. This lack of confidence may discourage individuals from reporting counterfeit medicines, and therefore, the regulatory authority should consider improving its efforts to increase public trust and encourage reporting.

The largest percentage of respondents (70.9%) agreed that the lack of knowledge on how to report such medicines was a challenge, with 17% remaining neutral and 12.1% disagreeing. This knowledge gap may be due to inadequate public awareness campaigns by the regulatory authority.

The fear of consequences if identified as the informant was identified as a challenge by 42.9% of respondents, with 26.9% remaining neutral and 30.2% disagreeing. This fear may be due to concerns about personal safety or retribution from counterfeiters.

Additionally, 45.1% of respondents agreed that past experiences of inaction after reporting counterfeit medicines posed a challenge, with 29.7% remaining neutral and 25.3% disagreeing. This lack of action could lead to frustration and discourage individuals from reporting counterfeit medicines in the future.

Finally, 51.6% of respondents identified a lack of adequate understanding of the importance of reporting counterfeit medicines as a challenge, with 20.9% remaining neutral and 27.5% disagreeing. This lack of understanding could be due to inadequate public awareness campaigns or poor communication from regulatory authorities.

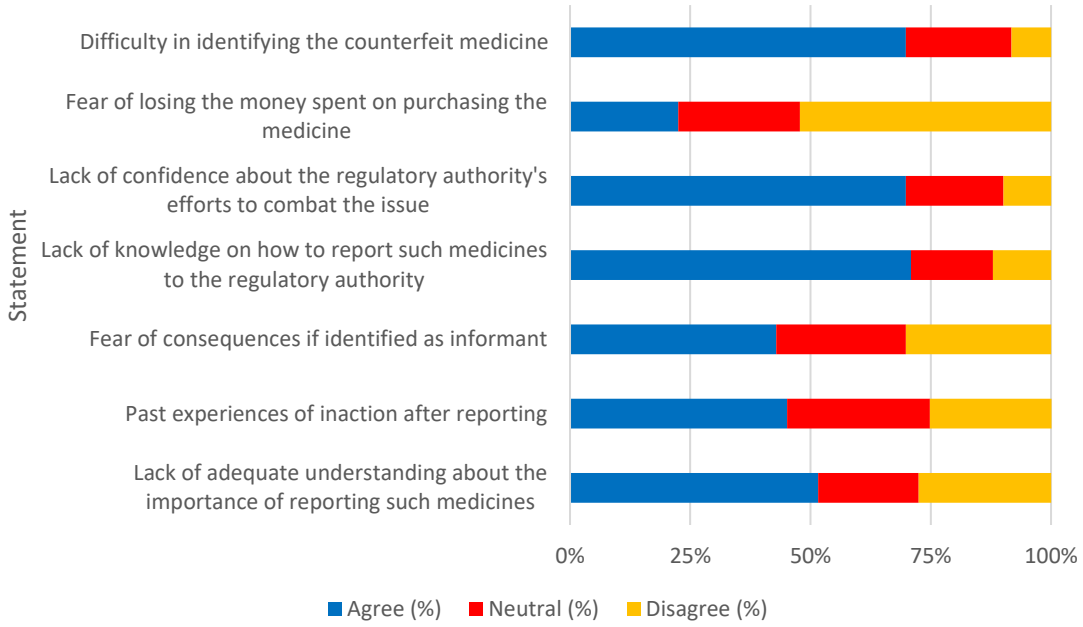

Figure 15: Challenges Consumers Face in Reporting Counterfeit Medicines

4.2.5 Counterfeit Medicines Reporting – Consumers' Recommendations (Questions 18i – v)

This section presents the proposed recommendations for respondents to agree or disagree with, aimed at improving the reporting of counterfeit medicines in Lagos, Nigeria. It is noteworthy

that a majority of respondents agreed with all the recommendations as effective in addressing the issue of counterfeit medicine reporting in Lagos, Nigeria.

Specifically, 91.2% of respondents agreed that education and awareness programs to teach people how to identify counterfeit medicines would be effective, with only 8.2% remaining neutral and 0.5% disagreeing. This indicates a high public awareness level regarding the importance of education and awareness campaigns to combat counterfeit drugs.

Concerning the establishment of a system of reimbursement for those who report counterfeit medicines, 74.7% of respondents agreed that it would be effective, while 19.8% remained neutral, and 5.5% disagreed. Although this recommendation had relatively lower support compared to others, it still suggests that incentives such as reimbursement could motivate people to report counterfeit drugs.

Furthermore, 89.8% of respondents agreed that the identity of those who report counterfeit medicines should remain anonymous, with 8.8% remaining neutral and 2.2% disagreeing. This indicates that people are more likely to report counterfeit drugs if they are assured of confidentiality.

In addition, 86.3% of respondents agreed that the regulatory authority should provide regular updates to people on the status of their reports and investigations, with 12.1% being neutral and 1.6% disagreeing. This highlights the need for transparency in the reporting and investigation process to build public trust and confidence.

Lastly, 89.6% of respondents agreed that the government and regulatory authorities should sponsor awareness campaigns to educate the public on the importance of reporting counterfeit medicines, with 9.3% being neutral and 1.1% disagreeing. This emphasizes the need for sustained efforts by the government and regulatory authority to sensitize the public on the importance of reporting counterfeit drugs.

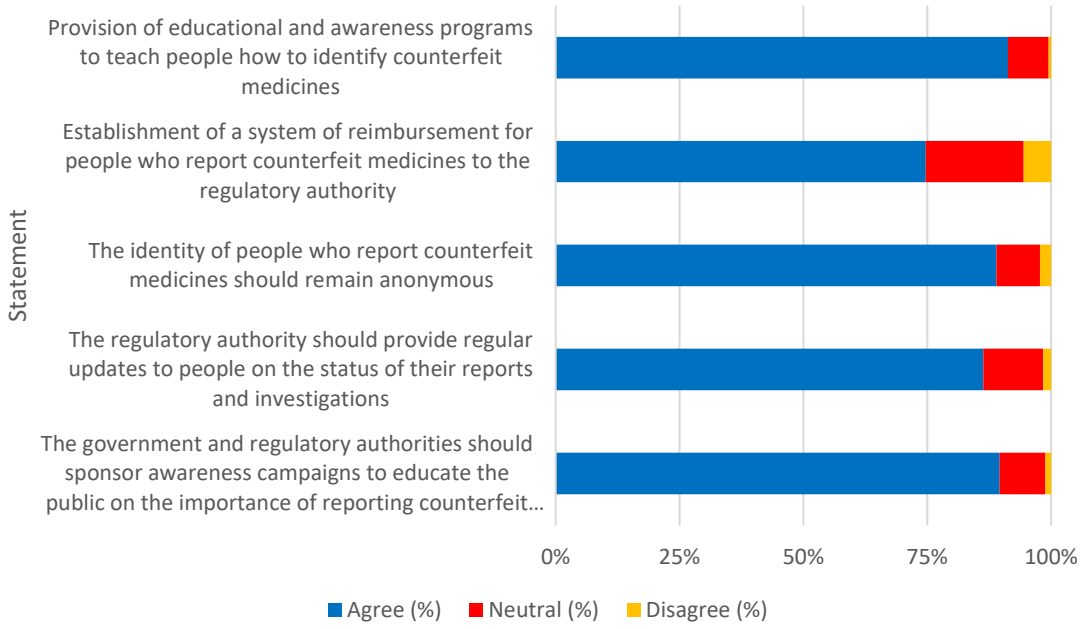

Figure 16: Consumers' recommendations to improve counterfeit medicine reporting in Lagos, Nigeria

4.3 Analysis of Pharmacists' Responses

Response Rate: The survey was administered to a total of 190 pharmacists over a period of 28 days, from March 20th to April 16th, 2023. Out of those, 126 responses were collected, resulting in a response rate of 66.3%.

4.3.1 Pharmacists' Demographics (Questions 2-5)

Table 3 presents the demographics of pharmacists that participated in the survey. According to the results, 58% of the pharmacists were female, while the remaining 42% were male. The majority of the pharmacists (59.5%) were young adults aged between 18-30 years, with 35.7% falling into the age group of 31-40 years. Only a small proportion of pharmacists (3.2%) were aged 41-50 years, and 1.6% were aged 51 years and above.

As for their experience, most pharmacists (61.9%) had been practicing for 1-5 years, while 22.2% had been practicing for 6-10 years. A small percentage (5.6%) had been practicing for less than a year, while 10.3% had been practicing for over 10 years. In terms of practice setting, the majority of pharmacists (46.8%) worked in community settings, with 21.4% working in Industry and 16.7% in hospitals. Only a small percentage (0.8%) worked in academia, while 7.9% worked in regulation, and 6.4% worked in other areas, including research, sales & marketing, health insurance, and online services.

Table 3: Pharmacists Demographics

Question	**Options**	**Responses (N)**	**Responses (%)**
What is your gender?	Male	53	42
	Female	73	58
	Prefer not to say	0	0
	Total	*126*	*100*
What is your age group?	18-30 years	75	59.5
	31-40 years	45	35.7
	41-50 years	4	3.2
	51 years & older	2	1.6
	Total	*126*	*100*
How long have you been practicing as a pharmacist in Lagos?	Less than a year	7	5.6
	1 – 5 years	78	61.9
	6 – 10 years	28	22.2
	Over 10 years	13	10.3
	Total	*126*	*100*
What is your area of practice?	Hospital	21	16.7
	Community	59	46.8
	Academia	1	0.8
	Industry	27	21.4
	Regulation	10	7.9
	Other	8	6.4
	Total	*126*	*100*

4.3.2 Pharmacists' Awareness of Counterfeit Medicines in Nigeria (Questions 6-9)

In this section, the researcher presented the pharmacists' knowledge of counterfeit medicines and their presence in Nigeria.

Question 6:

Here, the researcher inquired whether the participants were aware of the existence of counterfeit medicines in Nigeria. As presented in Table 4, all the respondents affirmed their awareness, indicating a 100% response rate. This outcome is not surprising, given their vital role in ensuring the safety and effectiveness of medications.

Table 4:Pharmacists' knowledge of the presence of counterfeit medicine in Nigeria

Question	Options	Response (N)	Response (%)
Do you know that counterfeit medicines are present in Nigeria?	Yes	126	100
	No	0	0
	Total	*126*	*100*

Question 7:

This question highlighted the various sources from which pharmacists in Lagos obtained knowledge about counterfeit medicines. The results showed that practical experience and drug campaigns were the most common sources, with 115 and 78 pharmacists respectively, indicating the importance of on-the-job training and ongoing awareness campaigns in keeping pharmacists informed about current issues in their field. Furthermore, 76 pharmacists reported learning about counterfeit medicines through university education, while 54 pharmacists reported obtaining knowledge from conferences, suggesting the importance of formal education and professional development opportunities in educating pharmacists about this issue. Notably, none of the pharmacists surveyed reported lacking knowledge about the existence of counterfeit medicines in Nigeria.

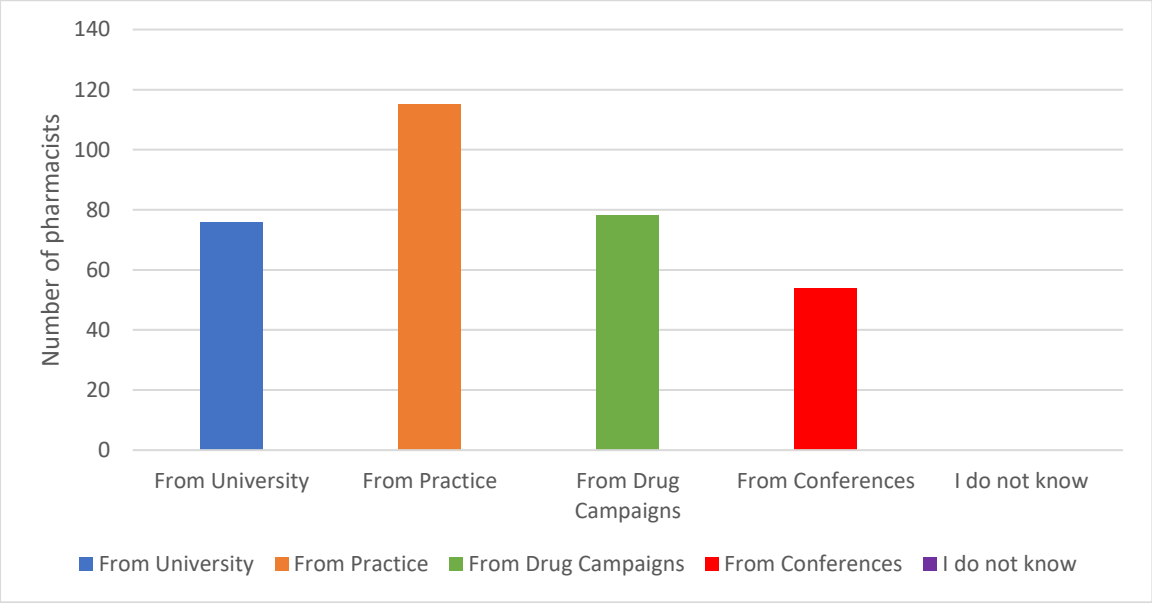

Figure 17: Pharmacists' source of knowledge about counterfeit medicines

Question 8

Figure 18 presents the responses of the surveyed pharmacists in Lagos regarding their definition of counterfeit medicines. Out of the 126 pharmacists who participated in the study, 118 defined counterfeit medicines as medicines that are deliberately produced with the intent to deceive people into thinking they are genuine medicines. Additionally, 101 pharmacists defined counterfeit medicines as medicines that contain no active pharmaceutical ingredients or inferior quality of active pharmaceutical ingredients. Moreover, 97 pharmacists defined counterfeit medicines as medicines that contain incorrect amounts of active pharmaceutical ingredients or the wrong active pharmaceutical ingredients.

It is noteworthy that none of the surveyed pharmacists reported being unable to define counterfeit medicines. The results indicate that pharmacists in Lagos have a strong understanding of what counterfeit medicines are, with the vast majority able to provide accurate definitions.

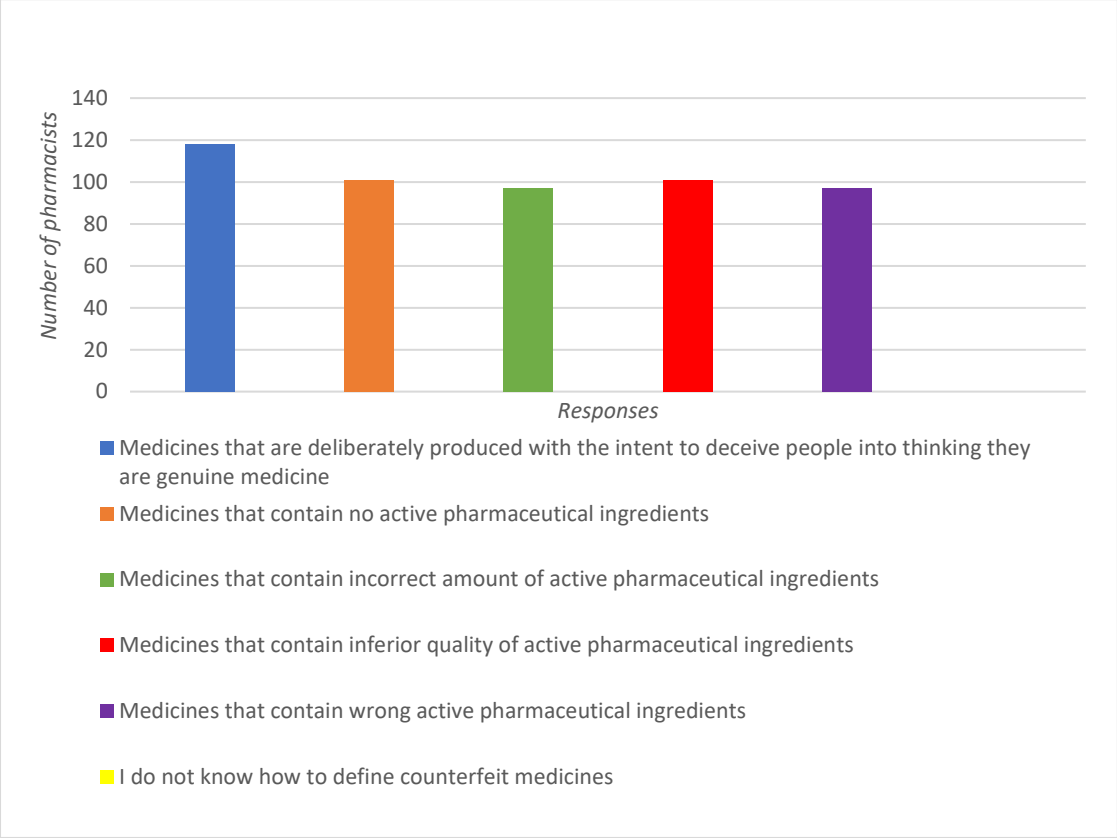

Figure 18: Pharmacists' Definition of Counterfeit Medicines

Question 9:

In this question, the pharmacists were asked to select all options that identify the risk of counterfeit medicines. The results, as shown in Figure 19, showed that all of them identified treatment failure as a risk, 119 pharmacists identified adverse reactions, 111 pharmacists identified antimicrobial resistance, 118 pharmacists identified prolonged recovery time, and 122 pharmacists identified death. None of the pharmacists indicated a lack of knowledge about the issue.

The fact that all the pharmacists provided an answer suggests that they understand the risks associated with counterfeit medicines, which is important given their role in dispensing medications to patients.

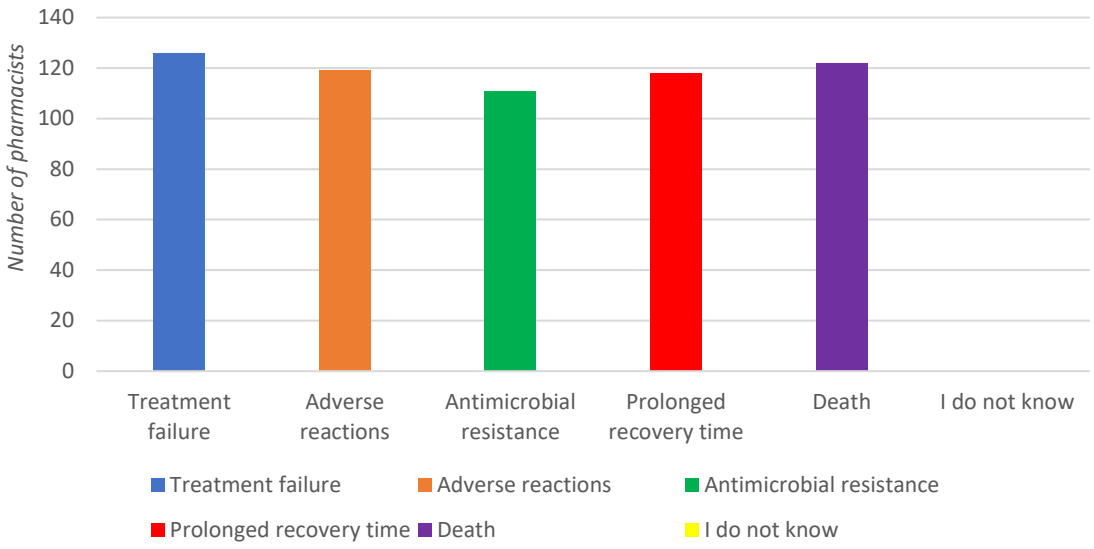

Figure 19: Pharmacists' Responses to the Risk of Counterfeit Medicines

4.3.3 Pharmacists' Attitude Toward Reporting Counterfeit Medicines (Questions 10-15)

Question 10:

Here, the pharmacists were asked about the organization responsible for handling counterfeit medicine reports in Nigeria. According to the responses, presented in Figure 20, 125 pharmacists (99%) correctly identified the National Agency for Food and Drug Administration and Control (NAFDAC) as the organization responsible, while only one pharmacist (1%) identified the Pharmacists Council of Nigeria (PCN). No pharmacists indicated that they did not know the answer or that the World Health Organization (WHO) was responsible. This information suggests that there is a high level of awareness among pharmacists in Lagos about the role of NAFDAC in handling reports of counterfeit medicines.

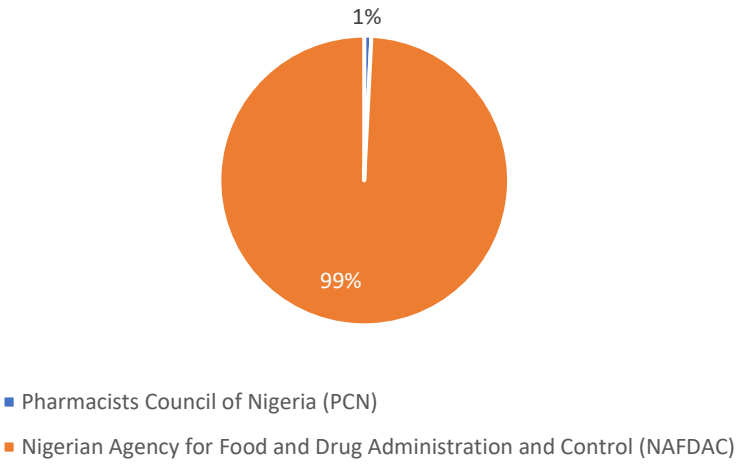

Figure 20: Pharmacists' Response to Counterfeit Medicine Reporting Organization

Question 11:

According to the results presented in Figure 21, 75% of the participants (94 pharmacists) reported encountering counterfeit medicines during their practice, while the remaining 25% (32 pharmacists) did not. These findings imply that a significant number of pharmacists have encountered counterfeit medicines in their practice, which is concerning as it may indicate a high occurrence of counterfeit drugs in the local market.

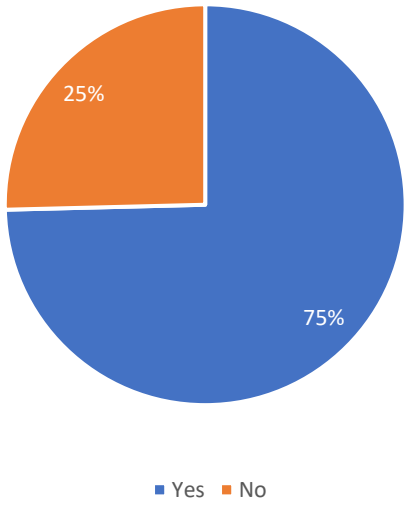

Figure 21: Pharmacists' Encounter with Counterfeit Medicines

Question 12:

In analyzing the methods used by pharmacists to identify counterfeit medicines, it was found that 66 pharmacists identified counterfeit medicines based on the appearance of the medicine. The majority, 78 pharmacists, identified counterfeit medicines based on the packaging appearance. 49 pharmacists identified counterfeit medicines by incorrect label information, while only 17 pharmacists based on side effects after taking the medicine.

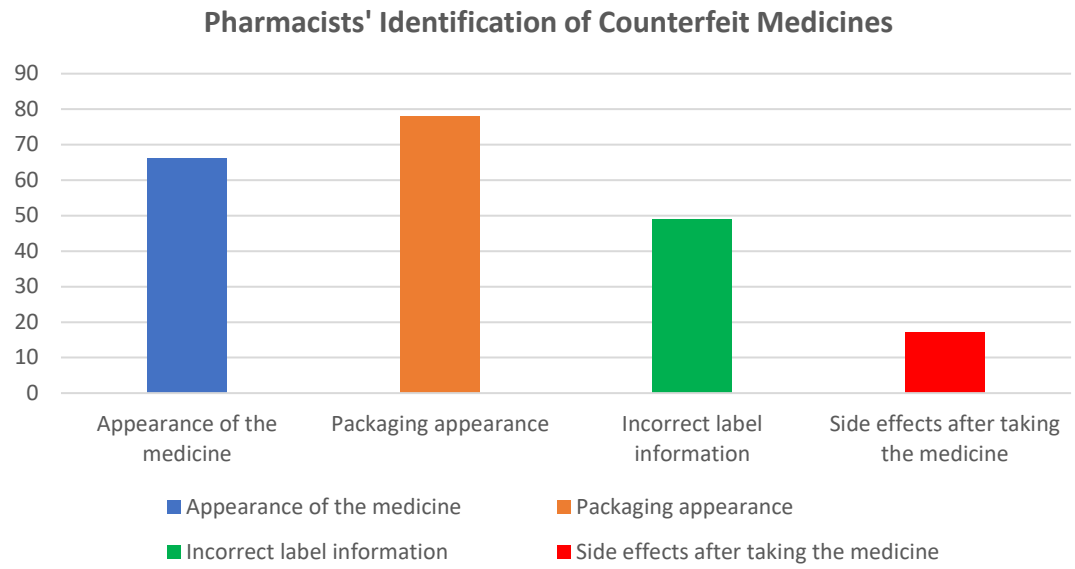

Figure 22: Pharmacists' Identification of Counterfeit Medicines

This revealed that a significant proportion of pharmacists relied on the packaging and appearance of the medicines to identify counterfeits, while a smaller number relied on incorrect information or side effects experienced after taking the medicine.

Question 13:

Figure 23 presents the actions taken by pharmacists who encountered counterfeit medicines. The majority of pharmacists (42, 45%) reported the counterfeit medicine to the relevant authority, which is an important step in preventing the distribution of such drugs in the market and protecting the public from potential harm. A smaller proportion of pharmacists returned the medicine for a refund (20, 22%), while 31 pharmacists (33%) discarded the medicine. None of the pharmacists reported continuing to use the counterfeit medicine.

The findings indicated that less than half of the total pharmacists who had encountered counterfeit medicines reported them to the regulatory authority, which may suggest a negative attitude towards reporting such drugs among pharmacists in Lagos.

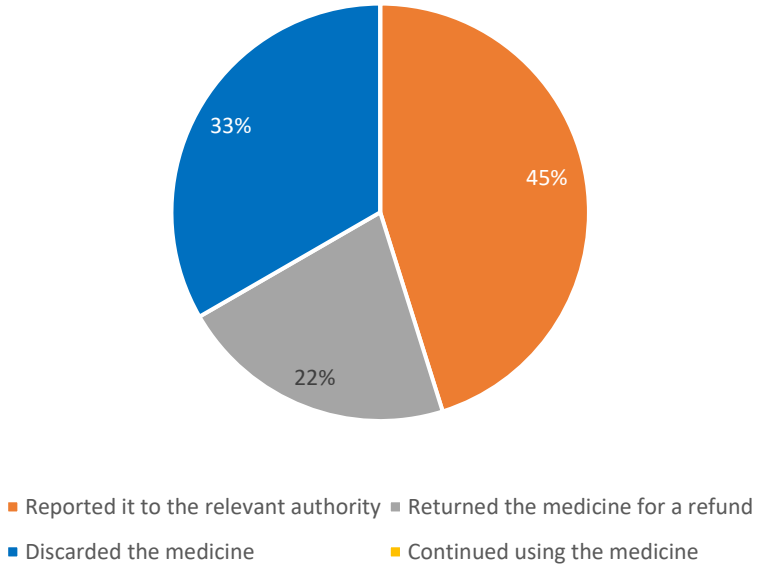

Figure 23: Actions taken by Pharmacists after encountering counterfeit medicines

Questions 14 – 15

Question 14 asked the pharmacists whether reporting counterfeit medicines was important. All 126 pharmacists (100%) agreed that it was vital to report such medicines, demonstrating their unwavering dedication to patient safety and public health.

In question 15, the pharmacists were asked to choose their reasons for reporting counterfeit medicines. The results, as presented in Figure 24, showed that most of the respondents indicated the need to protect public health (99.2%, 125 pharmacists) and to prevent the further circulation of such medicines (98.4%, 124 pharmacists) as their reasons. Additionally, a significant proportion of pharmacists (93.7%, 118 pharmacists) selected the desire to contribute to the fight against counterfeit medicines, and 85.7% (108 pharmacists) chose the need to hold the manufacturers and distributors accountable as their reasons. These findings show a high level of awareness of the significance of reporting counterfeit medicines among pharmacists in Lagos.

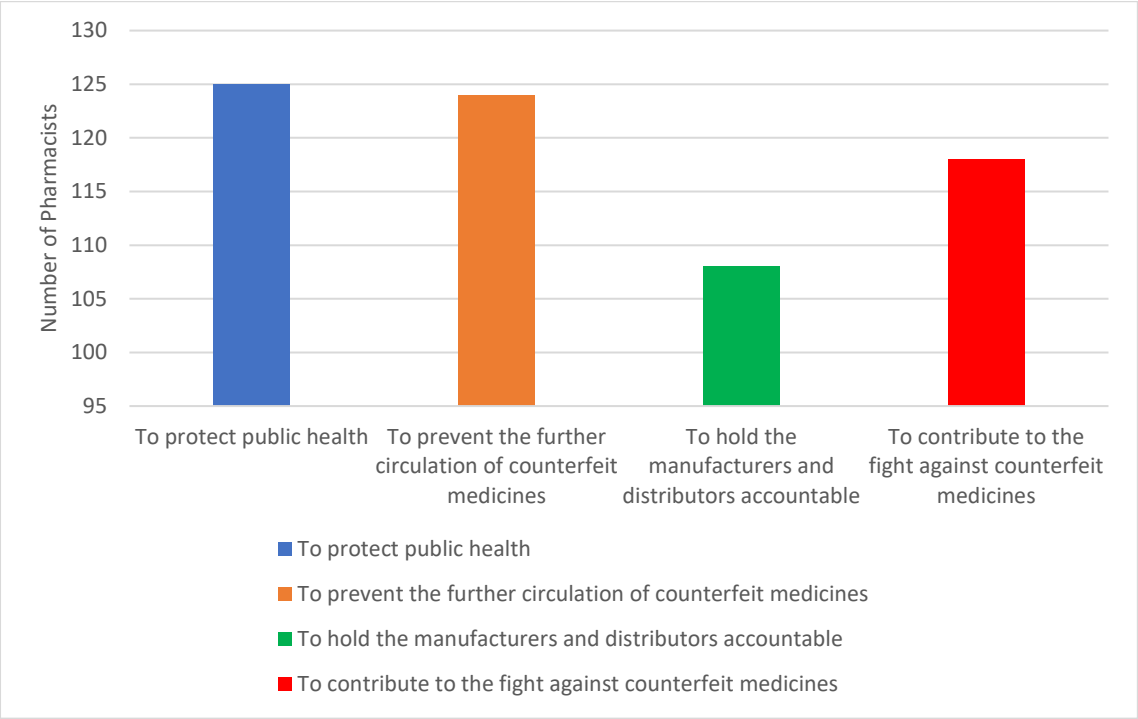

Figure 24: Pharmacists' Reasons for Reporting Counterfeit Medicines

4.3.4 Counterfeit Medicines Reporting – Pharmacists' Challenges (Questions 16i – vii)

The survey provided several options for pharmacists to identify their challenges in reporting counterfeit medicines.

According to the results, the most significant challenge was the difficulty in identifying counterfeit medicines. 64.3% of the pharmacists agreed with this, 23.8% were neutral, and 11.9% disagreed. This finding was not surprising since counterfeit medicines are often designed to look identical to genuine products, making it challenging to distinguish between them.

The fear of losing the money spent on purchasing the medicine was not considered a significant challenge by pharmacists. Only 24.6% of respondents agreed with this statement, while the majority (60.3%) disagreed. This finding is encouraging since fear of financial loss should not hinder pharmacists from reporting counterfeit medicines. Instead, reporting such medicines is crucial for protecting public health and ensuring that patients receive safe and effective treatments. However, it is worth noting that a quarter of the respondents still expressed fear of financial loss, which may be due to various reasons, such as the cost of the genuine product or a lack of reimbursement for the cost of the counterfeit product. Therefore, efforts should be made to address these concerns and provide pharmacists with support to report counterfeit medicines without fear of financial repercussions.

Furthermore, the results of the study indicated that a significant number of pharmacists lacked confidence in the regulatory authorities' efforts to combat counterfeit medicines. More than half of the respondents (54.8%) agreed with this statement, while 29.3% were neutral, and only 15.9% disagreed. This lack of confidence may stem from various factors, including insufficient resources and inadequate enforcement of regulations. Pharmacists who lack confidence in the regulatory authorities may be less likely to report counterfeit medicines, posing a substantial risk to public health. Therefore, it is essential to address the root causes of this issue, such as increasing resources and improving enforcement, to instill greater confidence in pharmacists and encourage them to report counterfeit medicines.

Over half of the pharmacists (51.6%) indicated the lack of knowledge on how to report counterfeit medicines to the regulatory authorities as a challenge, while 20.6% were neutral, and only a small percentage (27.8%) disagreed. Pharmacists who lack knowledge on how to report such medicines may be hesitant to do so, posing a significant public health risk. Therefore, there is a need to improve education and training on this topic by providing clear guidance on how to report such medicines and ensuring that the reporting mechanisms are easily accessible and user-friendly.

Also, the study results revealed that the fear of consequences, if identified as the informant, was not a significant challenge for pharmacists. Only a small percentage (29.4%) of respondents agreed with this statement, while a similar percentage (28.6%) were neutral, and the majority (42.1%) disagreed. However, it is important to ensure that pharmacists feel safe and protected when reporting such medicines, even if only a few expressed fear of the consequences. One way to address this is to provide anonymous reporting mechanisms, which can help protect the identity of the informant and reduce the risk of retaliation.

Moreover, more than one-third of the respondents (37.3%) agreed that past experiences of inaction after reporting were a major challenge faced by pharmacists in reporting counterfeit medicines, while 30.2% remained neutral and 32.5% disagreed. This outcome is worrying as past inaction may result in a lack of confidence in the regulatory authorities and discourage pharmacists from reporting counterfeit medicines. It is vital that regulatory authorities take reports of counterfeit medicines seriously and investigate them promptly. Additionally, they should provide feedback to the reporting pharmacist on the outcome of the investigation.

Finally, the lack of adequate understanding of the importance of reporting such medicines was not found to be a significant challenge, with only 26.2% of respondents agreeing with this statement, while a smaller percentage (17.5%) were neutral, and the majority (56.3%) disagreed.

This finding is encouraging since it suggests that pharmacists in Lagos recognize the importance of reporting such medicines to the regulatory authorities.

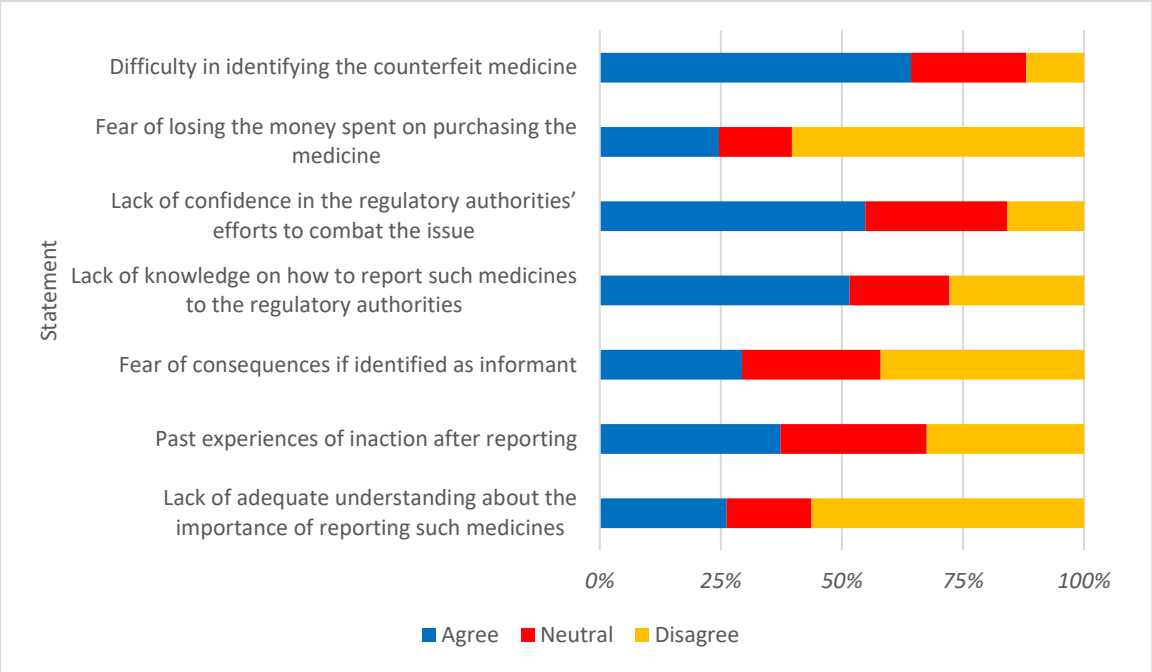

Figure 25: Challenges Pharmacists Face in Reporting Counterfeit Medicines

4.2.5 Counterfeit Medicines Reporting – Pharmacists' Recommendations (Questions 18i – vi)

This question aimed to offer interventions to respondents for them to agree or disagree with. The recommendation to provide regular training and education for pharmacists on how to identify counterfeit medicines received an overwhelmingly positive response, with 98.4% of pharmacists agreeing, 1.6% neutral, and no disagreement. This recommendation is essential in ensuring that pharmacists are equipped with the necessary knowledge and skills to identify counterfeit medicines. Furthermore, regular training and education update pharmacists on new counterfeit medicine trends, thereby enhancing their ability to recognize them.

The recommendation to establish a system of reimbursement for pharmacists who report counterfeit medicines to the regulatory authority had a lower level of agreement at 75.4%. Furthermore, 16.7% of pharmacists remained neutral, while 7.9% disagreed. A system of reimbursement can serve as an incentive for pharmacists to report such medicines, especially when they are faced with financial losses due to the rejection of counterfeit medicines. However, it should be noted that care must be taken to ensure that the reimbursement system does not encourage false reporting or abuse of the system.

The recommendation to provide regular training for pharmacists on how to report counterfeit medicines received a high level of agreement, with 97.6% of respondents agreeing and only 2.4% remaining neutral. This recommendation is crucial in ensuring that pharmacists possess the necessary knowledge and skills to make accurate and timely reports to the regulatory authorities.

A vast majority of pharmacists, specifically 92.9%, agreed that the identity of pharmacists who report counterfeit medicines should remain anonymous, while only 7.1% remained neutral. By keeping the identity of pharmacists who report such medicines confidential, pharmacists are more likely to report suspected counterfeit medicines without fear of retaliation or victimization.

99.2% of pharmacists agreed that the regulatory authority should provide regular updates on the status of their reports and investigations, with only 0.8% remaining neutral and no disagreement. Providing regular updates to pharmacists is essential in maintaining their motivation and confidence in the system, as it shows that their reports are being taken seriously and investigated. These updates can also help pharmacists to identify any gaps in their reporting and improve their future reports.

Lastly, 97.6% of respondents agreed with the recommendation that the government and regulatory authorities should sponsor awareness campaigns to educate pharmacists on the importance of reporting counterfeit medicines, while 2.4% remained neutral. Such education and awareness campaigns can help pharmacists to understand their role in identifying and reporting counterfeit medicines, which can lead to increased reporting rates and improved public safety.

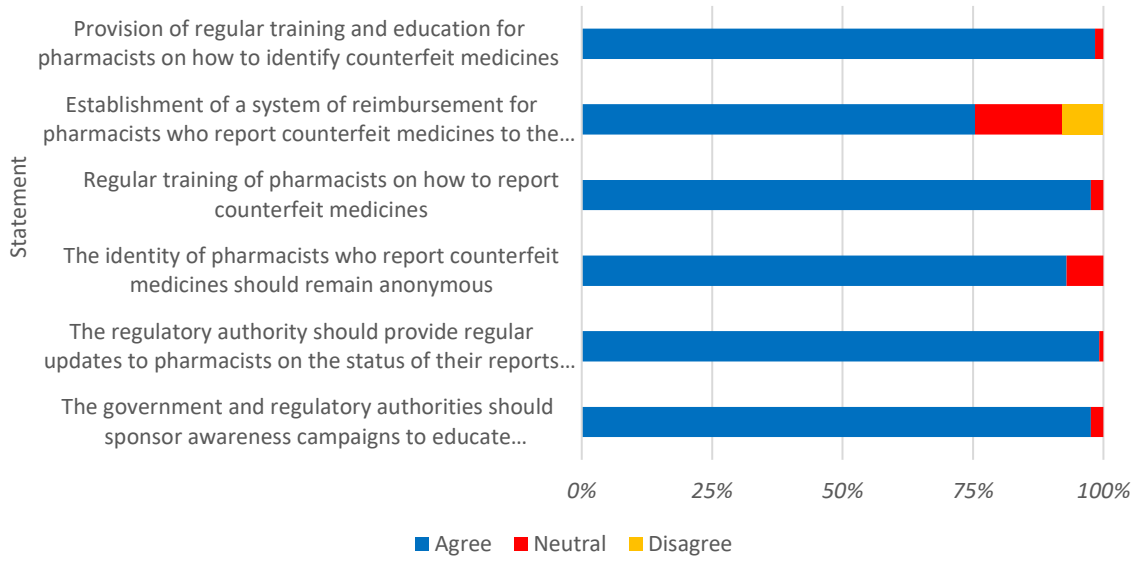

Figure 26: Pharmacists' Recommendations to Improve Counterfeit Medicine Reporting in Lagos, Nigeria

4.4 Test of hypothesis

To examine whether there was a significant difference in the challenges faced by consumers and pharmacists in reporting counterfeit medicines, the researcher conducted an independent sample t-test at a significance level of 0.05. Both groups were presented with seven identical items, outlined in Figure 15 and Figure 25, that represented the challenges they faced. The participants rated each item on a 3-point Likert scale format, where "Agree" was scored as 2, "Neutral" as 1, and "Disagree" as 0. The individual scores were summed up for each respondent and for the entire population in both groups. An independent sample t-test was used to compare the mean scores between the two groups because the analysis involved two independent groups of data.

Table 5 presents the outcome that demonstrated that consumers faced significantly more difficulties in reporting counterfeit medicines than pharmacists (p-value < 0.01). Consequently, we reject the null hypothesis (H0) stating that there is no significant difference in the challenges faced by consumers and pharmacists in Lagos when reporting counterfeit medicines and accept the alternative hypothesis (H1) that the challenges faced by consumers and pharmacists in Lagos when reporting counterfeit medicines are significantly different. This finding suggests that the challenges identified are more prevalent among consumers, which is not surprising since pharmacists, with their training, are better equipped to navigate through these challenges than consumers. The study's outcome underscores the need for more efforts to help consumers overcome these challenges and increase their reporting of counterfeit medicines.

Table 5: Independent sample t-test comparing the challenges faced by consumers and pharmacists

	Groups	N	Mean	Mean difference	**t-value**	p-value
Challenges	Consumers	182	9.0714	1.65873	4.489	<0.01
	Pharmacists	126	7.4127	1.65873		

4.5 Qualitative Analysis

4.5.1 Demographic Information of participants for the phone interviews

The table below presents the demographic data of the pharmacists who took part in the phone interviews on the subject matter.

Table 6: Demographics of participants

Participant	Gender	Experience Level (Years)	Area of Pharmacy Practice
1	Female	20	Hospital pharmacy
2	Male	17	Hospital pharmacy
3	Male	15	Hospital pharmacy
4	Male	15	Hospital pharmacy
5	Male	14	Community pharmacy
6	Male	20	Community pharmacy
7	Female	20	Community pharmacy
8	Female	14	Community pharmacy

4.5.2 Themes Formation

Phone call interviews were conducted with 8 highly experienced pharmacists to investigate their perspectives on counterfeit medicine reporting among pharmacists in Lagos. During the analysis of the interview data, each recognized theme was assigned a code to establish connections between topics. The analysis revealed four key themes which will be presented below along with the participants' responses. By combining the analyzed results from the phone interviews with the survey data, the researcher was able to draw a meaningful conclusion.

4.5.3 Themes Discussion

This section presents the discussion of the four key themes identified with each thematic discussion supported by transcribed quotes from the participants.

4.5.3.1 Theme 1- Awareness of The Presence of Counterfeit Medicine in Nigeria

From the analysis of the phone interviews, all respondents confirmed their awareness of the presence of counterfeit medicines in Nigeria when asked about it. The majority, that is 6 respondents, believed that the lack of proper regulation of drugs entering the country was the main reason for this issue. Other reasons mentioned were greed, where certain individuals prioritize profit over public health; high demand and low availability of medicines, and corruption, whereby some individuals register their drugs with NAFDAC using standard drugs, but later produce counterfeit ones.

When asked about the impact of counterfeit medicines on public health, all respondents confirmed that they had negative implications on the health of Nigerians. Some of the cited

consequences include treatment failure, mortality, morbidity, erosion of trust in healthcare practitioners, reduction in revenue for the producers of genuine medication, and financial losses for patients who purchased such medicines.

When questioned about the extent of the prevalence of counterfeit medicines in Nigeria, five pharmacists stated that the spread of such medicines has been significantly reduced since the tenure of the Late Professor Dora Akunyili, the former Director General of NAFDAC. They also acknowledged the efforts of subsequent regimes in NAFDAC in keeping the spread of such medicines low. On the other hand, the remaining three pharmacists admitted that they were uncertain about how widespread counterfeit medicines are in Nigeria, but they were certain of their existence.

Participant 1- *"Well if you asked me that question some years back, before the era of Dora Akunyili, I will give you almost 80%, but with the activities of Late Dora Akunyili, the former Director General of NAFDAC and subsequent regimes in NAFDAC, we have been able to reduce this significantly."*

Furthermore, when participants were asked about the medicines that were commonly counterfeited in Nigeria, all of them concurred that fast-moving drugs or drugs in high demand are the usual targets. Examples cited during the discussion included antibiotics, antimalarials, antihypertensives, branded drugs, and fast-moving addictive drugs such as tramadol and codeine-containing products.

Participant 5 - *"So, going down that line, we are looking at antibiotics which are heavily used, probably heavily abused, if I can add that as well. Antihypertensives, because of the cardiovascular disease, probably the top disease segment most people are suffering from. Yes, I have to put those two, and antimalarials in our own environment. I am not talking about global. So, in Nigeria, I would say antimalarials, antibiotics, and antihypertensives."*

4.5.3.2 Theme 2- Knowledge of Counterfeit Medicine Reporting Process

The respondents were asked if they had encountered counterfeit medicines during their practice. Out of the six who answered positively, only one pharmacist reported the case to NAFDAC. In this case, the counterfeit medicine was discovered in a hospital setting and the Head of the Department of Pharmacy was informed, who then reported it to NAFDAC officials via phone call to investigate the issue. In other cases where the counterfeit medicines were not reported, the pharmacists admitted to handling the situation by either discarding the product or returning it to the supplier. The main reasons for not reporting these incidents included the lack of time, the stressful reporting process, and the absence of evidence to confirm that the product was counterfeit.

Additionally, all participants were asked about their knowledge of the reporting process to NAFDAC for counterfeit medicines. Unfortunately, none of them were aware of the online complaint form that is available on the NAFDAC website for reporting such cases. Instead, they all mentioned being familiar with the Yellow Form for Pharmacovigilance, which is meant for adverse drug reaction reporting and not counterfeit medicines. It was observed that the pharmacists mistakenly assumed that both types of reports were submitted using the same process because NAFDAC oversaw both counterfeit medicine reports and adverse drug reaction reports.

Participant 2– "*The one that I know that is easily at our disposal is the report on adverse drug reactions, but the counterfeit drug reporting is not something that is well pronounced."*

Participant 8- *"Well, the one I know is for adverse drug reactions. So, they are assuming that counterfeit drugs cause adverse drug reactions. So, there is a yellow form called National Pharmacovigilance Centre Form. NAFDAC is still in charge of that unit."*

This highlights the low awareness among pharmacists in Lagos about the reporting process for counterfeit medicines and the need for NAFDAC to organize awareness campaigns to address the issue.

4.5.3.3 Theme 3- Attitude of Pharmacists in Lagos Toward Reporting Counterfeit Medicines

Participants were asked to express their opinion on the behavior of pharmacists in Lagos towards reporting counterfeit medicines to NAFDAC. The rationale for this inquiry was based on their extensive years of experience, which allowed them to interact with numerous pharmacists and observe their reporting behaviors. Four pharmacists concurred that pharmacists in Lagos were willing to report but lacked motivation due to their belief that their reports would not receive the appropriate attention. The primary reason cited for this sentiment was the absence of feedback from NAFDAC. Additionally, the low level of awareness about the reporting process and the difficulty of reporting were mentioned.

Participant 1– "*Yes, there are times that pharmacists in Lagos are eager to do the right thing, but there is also this bias that if you go and report, what will be the outcome? Maybe because we have not been getting feedback from the authorities. Maybe that is why there is this bias in reporting, but everybody wants to report."*

Participant 7– "*I think that there is not enough awareness and enough motivation. I may not necessarily mean monetary motivation, but when there is a ready place you can lay your complaint without bottlenecks, you will be more willing to do it. When it is something you have to go out of your way to do, you would not want to go through stress."*

These views were supported by three other pharmacists who suggested that pharmacists may prefer to handle such situations themselves by verifying with the suppliers and only reporting to NAFDAC in more severe cases.

Participant 5 – "*They might want to do their own investigation themselves. You might want to start tracing the supply chain and try to know where it came from. It is a case-by-case basis, but I think generally, people want to involve the authorities when it has now become some kind of organized systemic counterfeiting. But if it is a singular event, then, you might not want to."*

Participant 4, who previously worked as a community pharmacist but now practices in the hospital setting, mentioned that counterfeit medicine reporting was typically not performed in community pharmacies, but mainly carried out in hospital practice. This was attributed to the lack of time community pharmacists have as they handle multiple responsibilities and the fear that such reports could damage the reputation of the pharmacy.

Participant 4 – "*I don't think community pharmacists are into reporting counterfeit drugs. In the community pharmacy where you have the pharmacist who is the beginning and end of the practice, even if there is one, he would rather not make a mountain out of it because it would affect his practice. For him to say this is fake and it is coming from his store, that would spread like wildfire. People would say that man sells fake drugs."*

In summary, the information obtained from the discussion with the participants revealed a negative attitude among pharmacists in Lagos toward reporting counterfeit medicines. The reasons for this included the lack of feedback from NAFDAC after reporting, unfamiliarity or difficulty with the reporting process, and concerns about the impact on the pharmacy's reputation. NAFDAC should address these issues to enhance the reporting of counterfeit medicines for the protection of public health.

4.5.3.4 Theme 4: Challenges and Recommendations for Enhancing the Reporting of Counterfeit Medicines

The participants were also questioned about the obstacles that hindered pharmacists in Lagos from reporting counterfeit medicines, as well as any suggestions they might have to improve the situation. They identified several challenges, including time constraints, a lack of a clear reporting system, low awareness of the reporting process, limited knowledge about how to report counterfeit medicines, a lack of feedback after reporting, and the absence of a laboratory to confirm suspicions before reporting.

Participant 3- *"I think one of the challenges is that the awareness is poor. There is no awareness at all. Then, there is also negative feedback on reports. NAFDAC should setup in such a way that anytime you flag the product, they would give you feedback after a week or some days of what they have done and what their finding is. That would complete the communication cycle."*

Participant 6- "*The number one challenge I see is the process of reporting. Initially, they brought a form for us to fill for counterfeit and adverse effects of drugs. After reporting, you will now have to drive from your location to NAFDAC's office to go and submit it. That stress is a lot. So, what I advocate for is, there should be something like an App that one can just log in and then make a report."*

To address the challenges, the participants suggested several recommendations, such as educating the public on how to report counterfeit medicines, providing confidentiality to those

who report such medicines, increasing awareness of the reporting process, establishing laboratories to verify suspicions before reporting, making the reporting process easy and stress-free, and providing feedback after reporting, as this helps to encourage further reporting by pharmacists.

Furthermore, the participants also agreed with the proposed recommendations in the survey and expressed their belief that implementing all the necessary measures would improve counterfeit medicine reporting in Nigeria.

4.6 Conclusion

The findings from the study indicated that consumers in Lagos were well-informed about the presence of counterfeit medicines in Nigeria and the dangers they pose to health. Although a significant number of people knew that NAFDAC was responsible for handling reports of counterfeit medicines, some level of confusion still existed, requiring NAFDAC to increase public awareness in Lagos about its responsibility in combating the issue.

Furthermore, the study also revealed that while consumers understood the importance of reporting counterfeit medicines, only a small proportion (19.5%) reported such products, with the majority (65%) choosing to discard them. This highlights a negative attitude toward reporting such medicines and underscores the need for NAFDAC to encourage the public to report counterfeit medicines to apprehend the culprits and prevent the continued distribution of such drugs, ultimately safeguarding public health.

In addition, the study found that pharmacists had a better understanding and awareness of the presence and risks of counterfeit medicines, as well as the responsible regulatory authority, which was expected given their education and professional training. However, data from the questionnaire survey showed that less than half of the pharmacists (45%) who had encountered counterfeit medicines reported it to the authorities, indicating a negative attitude among pharmacists toward such reporting. This discovery was also confirmed by the information gathered from interviews with the experienced pharmacists. This is concerning as pharmacists are crucial in providing healthcare services to the public and their attitude towards reporting counterfeit medicines could influence the public's perception. To improve the situation, NAFDAC needs to identify and address the obstacles that discourage pharmacists from reporting counterfeit medicines, which can also help boost the public's attitude towards reporting such medicines.

Finally, the study revealed that the top three challenges hindering the reporting of counterfeit medicines were the same for both consumers and pharmacists: lack of knowledge on how to

report (70.9% consumers, 51.6% pharmacists), difficulty in identifying counterfeit medicines (69.8% consumers, 64.3% pharmacists), and lack of confidence in the regulatory authority's effort in combating the issue (69.8% consumers, 54.8% pharmacists). This implies that prioritizing the resolution of these challenges would improve the reporting of counterfeit medicines by both groups. All recommendations provided in this study received high rates of approval from both consumers and pharmacists indicating that their implementation would significantly enhance the reporting of counterfeit medicines in Lagos, Nigeria.

In the next chapter, the researcher would provide answers to the research questions stated earlier, compare the primary research findings to the literature review and present an appropriate conclusion to the study.

CHAPTER 5: CONCLUSION AND RECOMMENDATION

5.1 Answering the Four Main Research Questions

Question 1: What is the level of awareness of consumers and pharmacists in Lagos about the existence of counterfeit medicines and the dangers they pose?

This study revealed a high level of awareness among consumers and pharmacists in Lagos regarding the presence of counterfeit medicines in the country and their health risks.

The survey results indicated that consumers in Lagos had a fundamental understanding of counterfeit medicines and were informed of their presence and dangers in the country. The media and healthcare professionals were the most common sources of their information.

In contrast to consumers, pharmacists in Lagos demonstrated a greater level of awareness regarding the subject matter, which was expected given their education and professional training. They primarily obtained information from their practice and drug campaigns. Overall, the study revealed that the population in Lagos had a good understanding of the issue of counterfeit drugs.

Question 2: What is the attitude of consumers and pharmacists toward reporting counterfeit medicines in Lagos, Nigeria?

According to the study, there was a negative attitude among consumers and pharmacists in Lagos toward reporting counterfeit medicines.

The survey data revealed that only a small proportion of consumers and less than half of the pharmacists who encountered these products reported to NAFDAC. Furthermore, the qualitative data analysis highlighted that pharmacists lacked the motivation to report such medicines. This situation is worrisome as NAFDAC requires the cooperation of all stakeholders to combat this problem effectively. NAFDAC needs to address this issue swiftly, otherwise Lagos and Nigeria will remain a favorable environment for the distribution of counterfeit medicines.

Question 3: What are the challenges faced by consumers and pharmacists in reporting counterfeit medicines in Lagos, Nigeria?

Based on the study's findings, it was clear that both consumers and pharmacists in Lagos encounter various challenges when reporting counterfeit medicines. To support NAFDAC in improving the situation promptly, the researcher suggests prioritizing the challenges identified by the majority of the participants in each group, as they may indicate urgent issues. These include the lack of knowledge on how to report such medicines, difficulty in identifying these medicines and the lack of confidence in the Agency's efforts in combating the issue. This does

not diminish the importance of other challenges but serves as a starting point for NAFDAC to tackle the problem.

Question 4: What solutions can be recommended to overcome the challenges faced by consumers and pharmacists in reporting counterfeit medicines in Lagos, Nigeria?

The researcher presents the solutions to the challenges presented in the previous question, which were accepted by most of the participants in both groups. These include providing educational and awareness programs to teach consumers and pharmacists how to identify and report counterfeit medicines, as well as providing feedback to individuals regarding the status of their reports and investigations to improve the public's confidence in the Agency.

The researcher recommends that NAFDAC considers implementing these recommendations to improve the situation and safeguard public health.

5.2 Comparing the Results from Primary and Secondary Research

The secondary research findings indicated that Nigerian consumers and pharmacists had a significant level of awareness of the presence of counterfeit medicines in the country and the dangers they posed to health (Nneka and Olivia, 2020; Adigwe *et al.*, 2022), which was consistent with the primary research findings.

Furthermore, the review of literature indicated that both consumers and pharmacists in different countries affected by counterfeit medicines exhibited a negative attitude towards reporting such drugs, citing reasons such as unfamiliarity with the reporting process, lack of understanding about the significance of reporting such drugs, concerns about financial losses and a lack of confidence in the regulatory agency's effectiveness in handling the issue (Odili *et al.*, 2006; Binkowska-Bury *et al.* 2013). Interestingly, the same behavior was observed among consumers and pharmacists in Lagos, and these factors also contributed to the reason for their reluctance to report such products. Therefore, this implies that the solutions proposed in those studies could enhance the reporting of such drugs among these groups in Lagos.

5.3 Research Contributions and Limitations

Counterfeit medicines pose significant risks to the health of Nigerians and hence, require NAFDAC's utmost attention. This study adds to the existing knowledge of counterfeit medicines in Nigeria and sheds light on the perceptions of key stakeholders, consumers and pharmacists, on the issue. With these insights, NAFDAC can identify the areas that require improvements to win the support of these groups in combating the spread of these medicines in Lagos and Nigeria as a whole.

This study had two main limitations. Firstly, the researcher initially aimed to achieve a larger sample size with a smaller margin of error (5%). However, due to time constraints and participants' reluctance to share their opinions with a stranger, the researcher had to settle for a smaller sample size and a larger margin of error (8%). Secondly, the study's interviews were limited to pharmacists working in community and hospital settings only because the researcher was unable to access pharmacists practicing in other areas of pharmacy during the research period. This limitation may have introduced some bias into the perspectives of pharmacists in Lagos regarding the subject matter.

5.4 Recommendations for Practice

From the research findings, there existed some degree of confusion among the public in Lagos regarding the responsible organization for handling counterfeit medicines. As a result, NAFDAC should increase public awareness of its role in combating counterfeit medicines and encourage the public to report such medicines to apprehend the culprits and prevent the continued distribution of such drugs. This can be accomplished with media, such as television and radio broadcasts, and healthcare professionals as these were identified as the main source of information for the public on matters related to counterfeit medicines.

Additionally, NAFDAC should also develop educational and awareness programs to improve pharmacist's knowledge on how to identify and report counterfeit medicines. Such action would also have a positive impact on the public's behavior due to their close relationship with pharmacists on healthcare issues.

Finally, NAFDAC should partner with stakeholders, such as the pharmaceutical industry and law enforcement agencies, to develop effective strategies to curb the proliferation of counterfeit medicines, including strengthening border controls and imposing stricter penalties on those involved in the production and distribution of such drugs.

5.5 Recommendations for future research

Based on the limitations identified in this study, future research in this subject matter should consider the following recommendations. Firstly, researchers should include interviews with pharmacists practicing in other areas of pharmacy, such as industrial and regulatory settings, to provide a more comprehensive understanding of the perspectives of pharmacists in Lagos regarding the topic.

Secondly, future studies involving the use of questionnaire survey should be conducted over a longer period to achieve a larger sample size with a smaller margin of error. Additionally, the

researchers could explore other data collection methods, such as focus groups, to gather a wider range of perspectives from consumers and pharmacists.

Finally, future studies should consider comparing the perspectives of consumers and pharmacists in Lagos with those from other states in Nigeria to assess the generalizability of the findings.

5.6 Reflection and Conclusion

The research process was rigorous, enlightening, and exciting. The findings from the study improved the researcher's understanding of counterfeit medicines and the difficulties that consumers and pharmacists encounter when reporting them.

Although there are several reasons for the negative attitudes of consumers and pharmacists regarding the reporting of counterfeit medicines, this study identified the urgent issues which would allow NAFDAC to focus its efforts on addressing to promote reporting of such medicines among these groups and safeguard public health in Lagos, Nigeria.

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Appendix A: Consumer Questionnaire

Counterfeit Medicines Reporting in Lagos, Nigeria: Consumers Survey

Dear Respondent,

I am Sinclair Chibuzor Hillary, a post-graduate student at Griffith College Dublin, Ireland. I am conducting this dissertation research on the attitude and challenges of consumers towards reporting counterfeit medicines in Lagos, Nigeria as part of the requirement for the degree of Masters (MSc) in Pharmaceutical Business and Technology.

The purpose of this research is to assess the knowledge of the general public in Lagos about the presence of counterfeit medicines in the Nigerian market, as well as their willingness to report such medications. Additionally, this study seeks to identify the challenges that hinder residents of Lagos from effectively reporting these drugs and provide recommendations to overcome these obstacles. Such interventions could be implemented in other States to reduce the prevalence of counterfeit medicines in the country.

Participation in this research is completely voluntary, and your responses will be kept entirely anonymous and confidential. The data obtained from this survey will be used solely for the purpose of my research and will be stored in compliance with the General Data Protection Regulation (GDPR).

The survey comprises 5 sections aimed at collecting information on participants' demographics, awareness, attitudes, challenges, and recommendations for improvement of counterfeit drug reporting in Lagos, Nigeria.

It will take only 5-7 minutes to complete this survey. By participating in this survey, you are granting your consent for the information you provide to be used for the purpose of this research.

Thank you for your participation.

1. Participant Agreement
   - o I agree to voluntarily participate in this research study and give consent to have my responses used for this purpose

SECTION A
Demographics

2. What is your gender?
   - o Male
   - o Female
   - o Prefer not to say

3. What is your age group?
   - o 18-30 years
   - o 31-40 years
   - o 41-50 years
   - o 51 years and older

4. What is your highest level of education?
   - o No formal education
   - o High school
   - o Undergraduate
   - o Postgraduate

5. What is your occupation?
   - o Student
   - o Academic professional
   - o Self employed
   - o Corporate/office worker
   - o Unemployed

6. How long have you been resident in Lagos, Nigeria?
   - o Less than a year
   - o 1 to 2 years
   - o 2 to 5 years
   - o 5 years and above

SECTION B
Consumer Awareness about Counterfeit Medicines

7. Do you know that counterfeit medicines are present in Nigeria?
   - o Yes
   - o No

8. What is your source of knowledge for this information? Please select all that apply
   - o Family/Friends
   - o Healthcare professionals
   - o Media
   - o Drug campaigns
   - o I do not know that counterfeit medicines exist in Nigeria

9. How would you define counterfeit medicines? Please select all that apply
   - o Medicines made to deceive people into thinking that they are the original medicine
   - o Medicines that lack the expected active substance to effectively treat an illness
   - o Medicines that do not contain the right amount of active substance to effectively treat an illness
   - o Medicines that contain low-quality active substances for the effective treatment of an illness
   - o I do not know how to define counterfeit medicines

10. Please choose all options that identifies the risks of counterfeit medicines
    - o Treatment failure
    - o Adverse reactions
    - o Antimicrobial resistance
    - o Prolonged recovery time
    - o Death
    - o I do not know

SECTION C
Consumer Attitude toward Reporting Counterfeit Medicines

11. Which organization is responsible for handling counterfeit medicines reports in Nigeria?
    - o Pharmacists Council of Nigeria (PCN)
    - o National Agency for Food and Drug Administration and Control (NAFDAC)
    - o World Health Organization (WHO)
    - o I do not know

12. Have you ever encountered counterfeit medicines?
    - o Yes
    - o No

13. How did you identify it? Please select all that apply
    - o Appearance of the medicine
    - o Packaging appearance
    - o Incorrect label information
    - o Side effects after taking the medicine
    - o I have not encountered counterfeit medicines

14. What did you do when you encountered counterfeit medicine?
    - o Reported it to the relevant authority
    - o Returned the medicine for a refund
    - o Discarded the medicine
    - o Continued using the medicine
    - o I have not encountered counterfeit medicines

15. Do you think it is important to report counterfeit medicines?
    - o Yes
    - o No

16. What are the reasons why you would report counterfeit medicines in Nigeria? (Tick all that apply)
    - o To protect public health
    - o To prevent further circulation of counterfeit medicines
    - o To hold the manufacturers and distributors accountable
    - o To contribute to the fight against counterfeit medicines
    - o I do not think it is important to report counterfeit medicines

SECTION D

Challenges Consumers face in Reporting Counterfeit Medicines

17. Which of these do you consider a challenge in reporting counterfeit medicines to the regulatory authority?

i) Difficulty in identifying the counterfeit medicine

o Agree o Neutral o Disagree

ii) Fear of losing the money spent on purchasing the medicine

o Agree o Neutral o Disagree

iii) Lack of confidence about the regulatory authority's efforts to combat the issue

o Agree o Neutral o Disagree

iv) Lack of knowledge on how to report such medicines to the regulatory authority

o Agree o Neutral o Disagree

v) Fear of consequences if identified as informant

o Agree o Neutral o Disagree

vi) Past experiences of inaction after reporting

o Agree o Neutral o Disagree

vii) Lack of adequate understanding about the importance of reporting such medicines

o Agree o Neutral o Disagree

SECTION E

Recommendations to Improve the reporting of counterfeit medicines by consumers

18. Which recommendations do you consider effective in improving counterfeit medicine reporting

i. Provision of educational and awareness programs to teach people how to identify counterfeit medicines.
   o Agree o Neutral o Disagree

ii. Establishment of a system of reimbursement for people who report counterfeit medicines to the regulatory authority.
   o Agree o Neutral o Disagree

iii. The identity of people who report counterfeit medicines should remain anonymous.
   o Agree o Neutral o Disagree

iv. The regulatory authority should provide regular updates to people on the status of their reports and investigations.
   o Agree o Neutral o Disagree

v. The government and regulatory authorities should sponsor awareness campaigns to educate the public on the importance of reporting counterfeit medicines.
   o Agree o Neutral o Disagree

Appendix B: Pharmacist Questionnaire

Counterfeit Medicines Reporting in Lagos, Nigeria: Pharmacists Survey

Dear Respondent,

I am Sinclair Chibuzor Hillary, a post-graduate student at Griffith College Dublin, Ireland. I am conducting this dissertation research on the attitude and challenges of pharmacists towards reporting counterfeit medicines in Lagos, Nigeria as part of the requirement for the degree of Masters (MSc) in Pharmaceutical Business and Technology.

The purpose of this research is to assess the knowledge of pharmacists in Lagos about the presence of counterfeit medicines in the Nigerian market, as well as their willingness to report such medications. Additionally, this study seeks to identify the challenges that impede pharmacists in Lagos from effectively reporting these drugs and provide recommendations to overcome these obstacles. Such interventions could be implemented in other States to reduce the prevalence of counterfeit medicines in the country.

Participation in this research is completely voluntary, and your responses will be kept entirely anonymous and confidential. The data obtained from this survey will be used solely for the purpose of my research and will be stored in compliance with the General Data Protection Regulation (GDPR).

The survey comprises 5 sections aimed at collecting information on participants' demographics, awareness, attitudes, challenges, and recommendations for improvement of counterfeit drug reporting in Lagos, Nigeria.

It will take only 5-7 minutes to complete this survey. By participating in this survey, you are granting your consent for the information you provide to be used for the purpose of this research.

Thank you for your participation.

1. Participant Agreement
   - o I agree to voluntarily participate in this research study and give consent to have my responses used for this purpose

SECTION A
Demographics

2. What is your gender?
   - o Male
   - o Female
   - o Prefer not to say

3. What is your age group?
   - o 18-30 years
   - o 31-40 years
   - o 41-50 years
   - o 51 years and older

4. How long have you been practicing as a pharmacist in Lagos?
   - o Less than a year
   - o 1 year to 5 years
   - o 6 years to 10 years
   - o Over 10 years

5. What is your area of practice?
   - o Hospital
   - o Community
   - o Academia
   - o Industry
   - o Regulation
   - o Other

SECTION B
Pharmacist Awareness about Counterfeit Medicines

6. Do you know that counterfeit medicines are present in Nigeria?
   - o Yes
   - o No

7. What is your source of knowledge for this information? Please select all that apply
   - o From University
   - o From Practice
   - o From Drug Campaigns
   - o From Conferences
   - o I do not know that counterfeit medicines exist in Nigeria

8. How would you define counterfeit medicines? Please select all that apply
   - o Medicines that are deliberately produced with the intent to deceive people into thinking they are genuine medicines
   - o Medicines that contain no active pharmaceutical ingredients
   - o Medicines that contain incorrect amount of active pharmaceutical ingredients
   - o Medicines that contain inferior quality of active pharmaceutical ingredients
   - o Medicines that contain wrong active pharmaceutical ingredients
   - o I do not know how to define counterfeit medicines

9. Please choose all options that identifies the risks of counterfeit medicines
   - o Treatment failure
   - o Adverse reactions
   - o Antimicrobial resistance
   - o Prolonged recovery time
   - o Death
   - o I do not know

SECTION C
Pharmacist Attitude toward Reporting Counterfeit Medicines

10. Which organization is responsible for handling counterfeit medicines reports in Nigeria?
    - o Pharmacists Council of Nigeria (PCN)
    - o National Agency for Food and Drug Administration and Control (NAFDAC)
    - o World Health Organization (WHO)
    - o I do not know

11. Have you encountered counterfeit medicines in your practice?
    - o Yes
    - o No

12. How did you identify it? Please select all that apply
    - o Appearance of the medicine
    - o Packaging appearance
    - o Incorrect label information
    - o Side effects after taking the medicine
    - o I have not encountered counterfeit medicines

13. What did you do when you encountered the counterfeit medicine?
    - o Reported it to the relevant authority
    - o Returned the medicine for a refund
    - o Discarded the medicine
    - o Continued using the medicine
    - o I have not encountered counterfeit medicines

14. Do you think it is important to report counterfeit medicines?
    - o Yes
    - o No

15. What are the reasons why you would report counterfeit medicines in Nigeria? (Tick all that apply)
    - o To protect public health
    - o To prevent further circulation of counterfeit medicines
    - o To hold the manufacturers and distributors accountable
    - o To contribute to the fight against counterfeit medicines
    - o I do not think it is important to report counterfeit medicines

SECTION D

Challenges Pharmacists face in Reporting Counterfeit Medicines

16. As a pharmacist, which of these do you consider a challenge in reporting counterfeit medicines to the regulatory authority?

i) Difficulty in identifying the counterfeit medicine

o Agree o Neutral o Disagree

ii) Fear of losing the money spent on purchasing the medicine

o Agree o Neutral o Disagree

iii) Lack of confidence about the regulatory authority's efforts to combat the issue

o Agree o Neutral o Disagree

iv) Lack of knowledge on how to report such medicines to the regulatory authority

o Agree o Neutral o Disagree

v) Fear of consequences if identified as informant

o Agree o Neutral o Disagree

vi) Past experiences of inaction after reporting

o Agree o Neutral o Disagree

vii) Lack of adequate understanding about the importance of reporting such medicines

o Agree o Neutral o Disagree

SECTION E

Recommendations for Improving the Reporting of Counterfeit Medicines by Pharmacists

17. Which recommendations do you consider effective in improving counterfeit medicine reporting?

i. Provision of regular training and education for pharmacists on how to identify counterfeit medicines.
   o Agree o Neutral o Disagree

ii. Establishment of a system of reimbursement for pharmacists who report counterfeit medicines to the regulatory authority.
   o Agree o Neutral o Disagree

iii. Regular training of pharmacists on how to report counterfeit medicines.
   o Agree o Neutral o Disagree

iv. The identity of pharmacists who report counterfeit medicines should remain anonymous.
   o Agree o Neutral o Disagree

v. The regulatory authority should provide regular updates to pharmacists on the status of their reports and investigations.
   o Agree o Neutral o Disagree

vi. The government and regulatory authorities should sponsor awareness campaigns to educate pharmacists on the importance of reporting counterfeit medicines.
   o Agree o Neutral o Disagree