Challenges impacting the reporting of Adverse Drug Reactions among healthcare professionals: Improving pharmacovigilance in Nigeria.

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

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I certify that the dissertation entitled:

"Challenges impacting the reporting of Adverse Drug reactions among healthcare professionals: Improving pharmacovigilance in Nigeria" submitted for MSc in Pharmaceutical Business and Technology is the result of my own work and that where reference is made to work of others, due acknowledgment is given.

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This dissertation is specially dedicated to my mother Mrs Victoria Anaedu, who through her unwavering love and sacrifices has given me wings to fly and reach for the stars. Her unrelenting strength and undeterred courage are the pillars on which I continue to strive for excellence.

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Abstract

The thesis aims to evaluate factors pertaining to reporting Adverse Drug Reactions (ADRs) among healthcare professionals- medical doctors and pharmacists- in Nigeria by conducting a questionnaire-based survey and phone interviews for quantitative and qualitative analysis respectively. To achieve this, the knowledge, awareness and challenges faced by medical professionals in relation to ADR reporting were considered in order to determine effective recommendations to improve ADR reporting practices and pharmacovigilance in Nigeria.

Both groups of healthcare professionals were compared to determine their opinions on frequency of observed and reported ADRs, reasons for high underreporting rates, awareness of ADR reporting methods, guidelines and regulations as well as the NAFDAC regulatory body responsible for handling submitted ADR reports. A total of 104 out of 140 responded to the survey, of whom 53 (75.7%) were medical doctors and 51 (72.9%) were pharmacists. Interestingly, 34.0% of medical doctors who responded did not know how to report ADRs compared to just 5.9% of pharmacists who responded. From the analysis conducted, the pharmacists had better knowledge, awareness and experience over medical doctors regarding ADR reporting in Nigeria. However, an overwhelming 90.0% of both groups of respondents opted for ADR reporting being made compulsory as a professional obligation towards pharmacovigilance.

The inaccessibility of ADR report forms when needed, complex reporting procedures, busy work schedules and lack of time remained the most challenging factors to ADR reporting while fear of legal liabilities or the clinical knowledge to identify ADRs were among the least challenges reported. Organising pharmacovigilance conferences and continuous education programs to improve awareness among healthcare professionals and including ADR reporting courses during undergraduate

professional training will improve knowledge of ADR reporting. Establishing ADR departments in healthcare institutions headed by ADR specialists and offering incentives in the form of professional recognition rather than financial rewards are sustainable recommendations to improve the practice of ADR reporting in Nigeria.

Key Words: Adverse Drug Reactions (ADRs): knowledge, awareness and challenges, Pharmacovigilance, ADR reporting systems, healthcare professionals, Nigerian Agency for Food and Drug Administration and Control (NAFDAC), National Pharmacovigilance Centre, ADR forms/e-reporting forms and Yellow card scheme.

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ABBREVIATIONS:

ADRs- ADVERSE DRUG REACTIONS

NAFDAC- NATIONAL AGENCY FOR FOOD AND DRUG ADMINISTRATION AND CONTROL

NPC- NATIONAL PHARMACOVIGILANCE AGENCY

UMC- UPPSALA MONITORING CENTRE

CDC- CENTRE FOR DISEASE CONTROL AND PREVENTION

USFDA- UNITED STATES FOOD AND DRUG ADMINISTRATION

HCP- HEALTHCARE PROFESSIONALS

EMA- EUROPEAN MEDICINES AGENCY

HPRA- HEALTH PRODUCTS REGULATORY AUTHORITY

MDCN- MEDICAL AND DENTAL COUNCIL OF NIGERIA

PCN- PHARMACEUTICAL COUNCIL OF NIGERIA

NDSAC- NATIONAL DRUG SAFETY AND ADVISORY COMMITTEE

VAERS- VACCINE ADVERSE EVENT REPORTING SYSTEM

CHAPTER 1: INTRODUCTION

1.1 Overview

"Wherever the art of Medicine is loved, there is also a love of Humanity."

— Hippocrates

The art of medicine constitutes prescribing, dispensing and administering of drugs by healthcare professionals (medical doctors and pharmacists) respectively. The effectiveness of these professionals and healthcare institutions in these areas is of paramount importance in fighting diseases, promoting optimal health and general wellbeing of patients. Through continuous innovation in research and development of drug substances, the pharmaceutical companies strive to ensure that the efficacy and safety of drug products are not compromised.

To maintain the highest standards for new drugs, the regulatory authorities ensure that strict guidelines are enforced during clinical trial phases and post market authorisation. Clinical trials only commence after pre-clinical studies in the lab are typically carried out using test tubes or animals. The ideal stages for a clinical trial involve phase 1 which comprises of safety studies on humans, phase 2 which includes expanded safety studies on a larger number of humans to determine the efficacy of drug substance to disease and adequate dosage specifications. Then phase 3 is conducted to ascertain drug effectiveness in treating a condition when compared to available treatment options and phase 4 trials are conducted to identify long term effects of the new drug after it is approved and enters the market.

Figure 1: Phases of Clinical Trials (MS Research Australia, 2019)

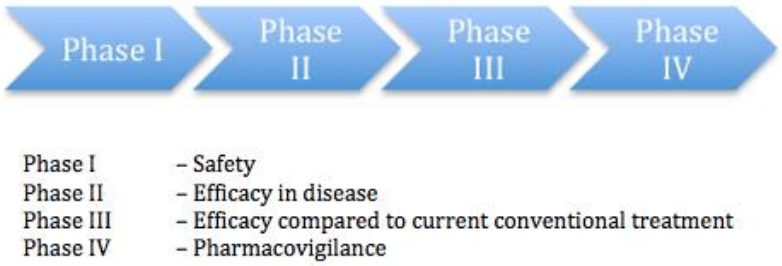

Figure 2: Pharmacovigilance in Phase 4 Clinical trials.

However, unfortunately after a new drug is approved, licensed and released to the market, the drug safety information available is usually limited. This is inevitable as the sample size of patient population involved during the clinical trials is small in comparison to the actual population of patients dependent on these prescription drugs. This phase marks the beginning of pharmacovigilance activities which includes ADR reporting. Children, young adults and elderly patients receiving concurrent drug therapies with pre-existing comorbidities are the most predisposed, hence there is a

global concern to reduce the rates of adverse reactions emanating from these susceptible set of patients.

Adverse event is an overview for any harm that occurs to a patient which can be temporarily associated with the use of a medicinal product or a therapeutic mechanism but may not be directly the cause of such medical occurrence. Side effects of drugs on the other hand are regular unintended occurrences at normal dose of a medicinal product as a result of the pharmacological properties of the drug substance and they equally negatively impact the general patient population. Adverse drug reaction is an example of adverse events which apart from impacting negatively the patients' population, also strains the health care resources of a community.

Accordingly, the World Health Organisation (WHO) defines an adverse drug reaction as a response to a drug that is noxious and unintended and occurs at doses normally used in man for prophylaxis, diagnosis or therapy of disease or for the modification of physiological function.' It can either be an unexpected adverse reaction or a serious adverse reaction. It is unexpected when the reaction observed or reported is inconsistent with the applicable medicinal products' information or drug characteristics. It becomes serious when such a medical occurrence at any given dose of such a medicinal product results in the patient being hospitalised, prolongs the duration of hospitalisation, causes remarkable incapacitation or disability, becomes life threatening or even results in death. The severity of ADRs can be grouped as minor, moderate, serious or lethal.

Minor: This requires no extended hospitalisation, no therapeutic intervention or antidote.

Moderate: This would usually require a change in the current drug therapy, an alternative treatment and may require a few days of extended hospitalisation.

Serious/Lethal: This is usually life-threatening and will require intensive medical intervention. It can result in significant permanent damage or even death of the patient directly or indirectly.

Most researchers classify ADRs traditionally into five types:

1. Type A reactions- These are sometimes called augmented reactions. They are dose dependent and are predictable based on the pharmacology of the drug. They are preventable and despite their high incidence and morbidity, the rate of mortality associated with them is comparatively low. Common examples in this category include haemorrhage associated with the use of anticoagulants, drowsiness associated with the use of benzodiazepines, bradycardia associated with the use of beta blockers, etc.

2. Type B reactions- These are also referred to as bizarre reactions which are not easily predictable based on the pharmacological mechanism of the drug at normal dosages. In contrast with the type A category, the rate of incidence and morbidity were relatively lower while the mortality rate associated with them were higher. A typical example is observed when a general anaesthesia is administered which can result in malignant hypothermia.

3. Type C reactions- These are referred to as chronic reactions. They are dose and time related with effects due to the accumulation of a drug over a long time. Some typical examples are seen in osteoporosis associated with an extended corticosteroid treatment resulting in organ damage.

4. Type D reactions- These are also called Delayed reactions. They are also dose and time related and becomes apparent sometime after the use of the drug. Some examples are seen in the use of tetracyclines resulting in teeth discolouration, carcinogenesis, patent ductus arteriosus and in the classical thalidomide disaster.

5. Type E reactions- These are classified as End of Use reactions and occurs soon after the withdrawal of a drug. Examples are noted in rebound hypertension after a centrally acting antihypertensive drug has been discontinued, opioid withdrawal syndrome, benzodiazepines and steroids.

Type A	Type B	Type C	Type D	Type E	Others
Side Effects	Allergic reactions	Drug dependence	Teratogenicity	Withdrawal reactions	Iatrogenic
Secondary effects	Idiosyncrasy	Cumulative toxicity	Mutagenicity		Photosensitive reactions
Toxic effects		Organ Damage	Carcinogenicity		Masking of diseases
Poisoning		Immunosuppression			Exacerbation of disease
Intolerance					

Table 1: Classifications of ADRs

An alternative and more comprehensive form of classification is based on the Dose of the drug, Time course of the adverse reaction and other significant susceptibility factors such as genetics, pathological and other biological differences (DOTS). The advantage of this classification style over others is that it helps healthcare professionals deduce the right diagnosis and prevention of ADRs in practice. (Coleman and Pontefract, 2016)

So, in order to reduce or even eradicate the impact of ADRs on the health and general well-being of patients, pharmacovigilance was introduced in healthcare. Pharmacovigilance as defined by the World Health Organisation is the science and activities relating to the detection, assessment, understanding and prevention of adverse events or any other medicine related issue. Its main goal is to encourage the safe and rational use of medicinal products which in turn improves general patient care and public health.

Regulatory Authorities

Several regulatory authorities serve to ensure that drugs available to the public are safe, efficacious and of highest attainable quality. Their scope of operation consists of stipulating and implementing pharmaceutical regulations related to research and development, drug product registration, manufacturing, distribution, pricing, marketing and intellectual property protection. They aim to protect patients from undue harm by eliciting previously undetermined drug hazards, identifying any predisposing factors, countering false safety signals generated either by spontaneous reporting, published case reports, cohort studies or post-marketing clinical trials. Some examples of regulatory agencies across the world include:

COUNTRY	**REGULATORY AUTHORITY**
Nigeria	National Agency for Food and Drug Administration and Control (NAFDAC)
UK	Medicines and Healthcare Products Regulatory Agency (MHRA)
USA	Food and Drug Administration (FDA)
Ireland	Health Products Regulatory Authority (HPRA)
Canada	Health Canada
Europe	European Medicines Agency (EMEA)
Netherlands	Medicines Evaluation Board
India	Central Drug Standard Control Organisation (CDSCO)

Italy	Italian Pharmaceutical Agency
Singapore	Centre for Pharmaceutical Administration Health Sciences Authority
Hong Kong	Department of Health: Pharmaceutical Services
Sweden	Medical Products Agency (MPA)
China	State Food and Drug Administration
Germany	Federal Institute for Drugs and Medical Devices
Malaysia	National Pharmaceutical Control Bureau, Ministry of Health
South Africa	Medicines Control Council
Uganda	Uganda National Council for Science and Technology (UNCST)
Japan	Ministry of Health, Labour & Welfare (MHLW)
INTERNATIONAL ORGANISATIONS	
World Health Organisation (WHO)	
Pan American Health Organisation (PAHO)	
International Conference on Harmonisation (ICH)	
World Intellectual Property Organisation (WIPO)	

Table 2: Regulatory Authorities and International Organisations(Sengar and Tripathy, 2011)

These regulatory measures became necessary after the thalidomide tragedy which influenced worldwide concerns for the safety of pharmaceutical drugs just as much as for the efficacy of the drug. Through the world health organisation program for international drug monitoring in 1968, studies and researches were put in place to advance pharmacovigilance globally. Through the program, all the member countries maintained a point of unified contact for gathering, analysing and sharing data gathered from individual incident reports worldwide. These member countries establish WHO-certified national pharmacovigilance centres where healthcare professionals can send individual case safety reports. VigiBase is the central WHO global database Uppsala Monitoring centre (UMC) where regionally collected reports are forwarded.

Several countries are members of this global WHO program, including Nigeria who joined the WHO program in 2004. According to the WHO programs' first set of regulations published in 2005, every hospital and tertiary healthcare institution with more than 50 beds for admissions is expected to employ a pharmacovigilance contact person, whose responsibility is to promote such pharmacovigilance activities including reporting ADRs, providing relevant education and training to healthcare professionals. Current legislation makes it the responsibility of all healthcare professionals to report all suspected or serious ADRs which are observed with new and existing medicines as well as those currently under review. This includes ADRs not listed in the drugs leaflet containing the summary of product characteristics, those due to the ineffectiveness of medicines, vaccines and drugs for treating chronic or life-threatening diseases, those due to misuse, abuse or overdose and those arising from the unregulated use of herbal products.

There are several possible ways of creating awareness for ADRs, nevertheless spontaneous reporting using the yellow cards for reporting has significantly contributed to better standards of pharmacovigilance. The Yellow card scheme is the UK system for gathering and collating information on suspected or unexpected ADRs

to medicinal products. This scheme was founded in 1964 by Bill Inman after the thalidomide tragedy and is managed by the Medicines and Healthcare Products Regulatory Agency (MHRA) and Commission on Human Medicines. Apart from its use to report ADRs on licensed medicines and vaccines, it can also cover reports emanating from herbal medications, traditional concoctions and other unlicensed medicines generally. Later on, it was expanded to include hospital and community-based pharmacists (Connelly, 2018) and offered more opportunity for people to report more adverse events and other suspected reactions. In 2015, a smartphone application to supplement the yellow card scheme was developed for both apple-iOS and google-android users to encourage a widespread participation, allowing patients and healthcare professionals to report ADRs, enabling alert updates from news pertaining to specific drugs and knowing how many yellow cards report a specific drug has received over time. (MHRA, GOV.UK, 2015)

Previous studies suggest the critical importance of healthcare professionals as it pertains to spontaneous reporting of ADRs and in developing a repository of ADR databases. While some studies have established that the bulk of responsibility lies mainly with medical doctors prescribing the medications, it is yet to be established whether pharmacists and other cadres of healthcare professionals play equally critical roles in the monitoring and reporting of ADRs particularly among the general patient population. Despite better awareness and attitudes to ADRs recently, under reporting remains a major challenge of spontaneous reporting. The low rates of ADR reporting among the diverse patient population poses a limitation to national efforts geared towards the identification and estimation of the risk-benefit ratio of medicinal products, which helps to support regulatory responses towards actionable issues that arise among these vulnerable patient groups. While the attitude and awareness of healthcare professionals towards ADRs were subjectively positive, the practicality of implementing adequate ADR reporting practices still faced serious challenges when considered. Insufficient knowledge of guidelines and regulations regarding ADR reporting, confusion as to who bears the ultimate responsibility of

ADR reporting among medical doctors and pharmacists, long work time constraints, ineffective ADR reporting systems, poor knowledge of ADR reporting procedures, fear of litigation and lack of financial incentives contribute to poor reporting rates globally.

1.2 Research Purpose:

This research study was undertaken with the purpose of identifying and exploring the challenges faced by healthcare professionals in spontaneously reporting ADRs with the aim of improving reporting rates, promoting drug safety practices and reducing the burden of ADRs in the general patient population in Nigeria. Issues emanating from ADRs in the general patient population are highly critical because of drug misinformation, misuse, advanced age related physiological, biological, pharmacokinetic and pharmacodynamic changes observed. When these patients suffer from an ADR, it is very challenging to correctly predict how severe the outcomes are, even when the benefits of the drug prescribed clearly outweigh the risks.

To adequately tackle this reality, the author proceeded with this assessment to help analyse the knowledge, attitude and experience of ADR spontaneous reporting among medical doctors and pharmacists in line with established guidelines and regulations by the relevant authorities in Nigeria. Although current spontaneous reporting practices are less than optimal, this research dissertation on ADR reporting was aimed at developing effective strategies which could be optimally leveraged to improve the frequency and quality of reporting while driving better positive health outcomes for patients across Nigeria.

1.3 Significance of the study:

In contrast to spontaneous reporting of ADRs recommended in tertiary healthcare centres and university teaching hospitals in Nigeria, there was a major gap in current literature towards pharmacovigilance practices and health care approaches for the general patient population when comparisons were made between medical doctors and pharmacists involved in healthcare management. Many healthcare professionals especially physicians mainly reported serious and life-threatening ADRs but were challenged by significant delays in tracking and reviewing test results and often expressed dissatisfaction with the established processes used in managing the spontaneous reporting of ADRs. The contribution of healthcare professionals to pharmacovigilance and ADR reporting observed in the general patient population helped to establish national ADR databases.

The National Pharmacovigilance Centre in Abuja, Nigeria is important in handling and processing of reports while advancing the evaluation of these ADRs to establish the benefit-risk ratio of such prescription or over-the-counter drugs. They promote a greater focus on medication monitoring, necessary to restructure and implement an ideal framework for ADR protocols, from the prescription process, to drug administration and observation of signs, symptoms and laboratory parameters. While a high rate of ADRs is ideally encountered in practice, the factors mitigating against effective reporting as depicted by the opinions and perspectives of healthcare professionals need to be addressed.

1.4 Research Objectives:

1. To evaluate the knowledge and awareness of ADR reporting among healthcare professionals in Nigeria
2. To assess challenges among healthcare professionals in the practice of ADR reporting in Nigeria.

3. To make sustainable recommendations to improve ADR reporting among healthcare professionals in Nigeria.

Research Questions:

1. Are healthcare professionals aware of ADR reporting in Nigeria, the reporting methods and systems available, the applicable guidelines and regulations and their responsibility towards good pharmacovigilance practices?
2. What factors pose as challenges to ADR reporting in Nigeria, predisposing to ADR under-reporting and poor implementation of ADR reporting and other drug safety practices in Nigeria?
3. What recommendations would help to improve ADR reporting among Nigerian healthcare professionals in clinical practice?

1.5 Structure of the study:

The primary research for this dissertation was structured to be carried out using a quantitative approach which involved the use of surveys and questionnaires and qualitative approach using phone interviews.

The use of questionnaires was designed for two major groups of healthcare professionals- medical doctors and pharmacists. First group was for the medical doctors who make the drug prescriptions in a University teaching hospital or tertiary healthcare centre while the second group was for pharmacists who dispense the prescribed drugs in the community or hospital pharmacy.

Each questionnaire was divided into five distinct sections:

1. First section requested information on demographics including bio data, education and level of experience.

2. Second section requested information on knowledge of ADR reporting and its systems.
3. Third section requested information on awareness of ADRs.
4. Fourth section requested information on factors that pose as challenges among healthcare professionals limiting ADR reporting.
5. Fifth section requested information on improving ADR reporting in Nigeria.

A qualitative study was also carried out by conducting phone interviews with highly experienced healthcare professionals to explore their experience and opinions regarding the practice of ADR reporting in Nigeria. The opinions obtained from these medical doctors and pharmacists regarding the knowledge, awareness and challenges associated with ADR reporting helped in complementing results obtained from the survey to present a balanced conclusion on the subject.

Hypothesis:

Null Hypothesis: All healthcare professionals in Nigeria have at a bare minimum, a basic knowledge of guidelines/regulations for spontaneous reporting of ADRs and are aware of their unique responsibility in reporting ADRs and promoting pharmacovigilance with other relevant regulatory authorities.

Alternate Hypothesis: There are challenges hindering pharmacovigilance and the spontaneous reporting of ADRs in Nigeria due to a lack knowledge of ADR guidelines/regulations among healthcare professionals (medical doctors and pharmacists) and a lack of commitment towards their respective responsibilities towards reporting ADRs.

1.6 Conclusion:

Several organisations such as the National Agency for Food and Drug Administration (NAFDAC) and National Pharmacovigilance Centre (NPC) continue to provide support and resources to facilitate pharmacovigilance and its awareness among healthcare professionals in Nigeria. An understanding of the challenges faced by healthcare professionals (medical doctors and pharmacists) in the spontaneous reporting of ADRs in the general patient population will help to better understand and address drug safety issues, improve the safety of medicines, strengthen drug safety practices, reduce the burden of rising healthcare costs and promote positive health outcomes and quality of life among the patient population.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

"As to diseases, make a habit of two things — to help, or at least, to do no harm."
— Hippocrates

Nigeria is a country located on the western coast of Africa. It consists of 36 states including the federal capital territory known as Abuja. According to the world population review as of 2019, the population is currently estimated to be over 201 million positioning it as the seventh largest in the world. Lagos State has the largest population with about nine million inhabitants. The Nigerian National Bureau of Statistics records the life expectancy rates in the country to unfortunately be the lowest in West Africa. (National Bureau of Statistics, 2019)

Figure 3: Infant Mortality and Total Fertility rates in Nigeria (Shelton, 2014)

The World Health Organisation estimates the average life expectancy to be around 54.5 years of age. These low values are significantly attributed to numerous health issues currently being faced in the country with residual effects of high mortality rates. It is estimated that one out of every five children born in Nigeria will die before they reach the age of five due to the numerous health risks and burden on health care in Nigeria. Nevertheless, the country has a faster population growth rate of 2.6%, which is significantly higher than other countries of the same size as current projections for 2050 is estimated to be over 390 million people. (World Population Review, 2019)

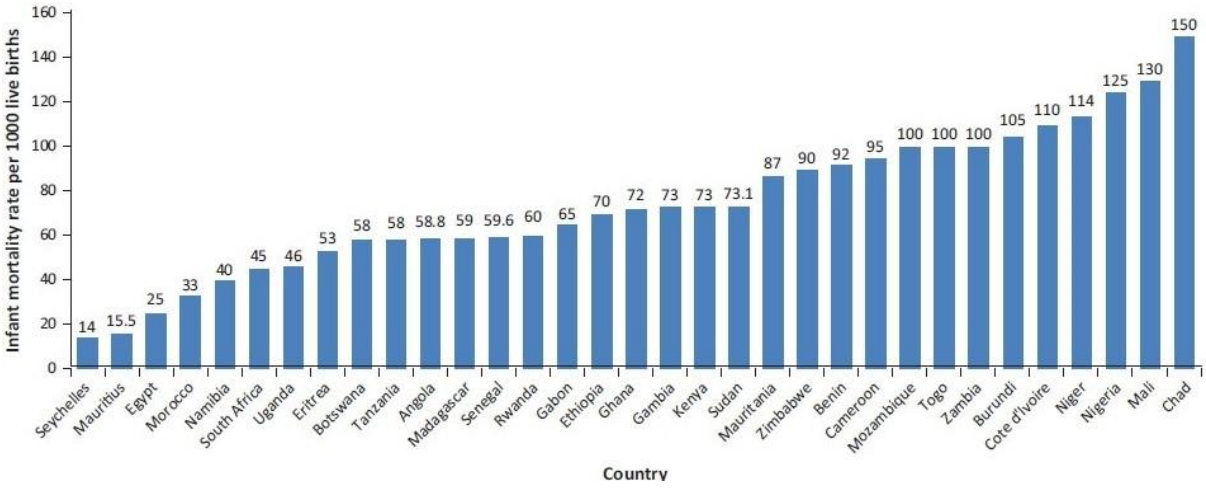

Figure 4: Infant Mortality rates in Nigeria compared to other Africa countries. (Alemu, 2017)

2.2 Adverse Events and the current state of reporting in Nigeria

Adverse events constitute an overview for any harm that occurs to a patient which can be temporarily associated with the use of a medicinal product or a therapeutic mechanism but may not be directly the cause of such medical occurrence. The Clinical Indemnity Scheme (CIS) defines a clinical incident as 'an event arising because of provision of, or failure to provide clinical care that results in injury, disease, disability, death or prolonged hospital stay for the patient'. The Health and

Safety Authority defines an adverse event as ‘an event or circumstance which could have or did lead to actual or possible personal injury, personal harm, property damage or loss’ (Madden, 2008). An example of an adverse event is Adverse drug reactions (ADRs).

With declining healthcare standards in Nigeria and the increasing population burden through the years, maintaining an effective reporting of ADRs remains a challenge. Inadequate staffing and financial remuneration of healthcare professionals continue to hamper positive attempts at pharmacovigilance by the government and as a result, ADRs remain under reported in clinical practice. While work environment constraints and ineffective reporting systems continue to plague efforts geared towards implementing WHO standards of pharmacovigilance, healthcare professionals lack the necessary will power to implement established guidelines and regulations stipulated by the relevant authorities. However, the involvement of healthcare professionals is necessary to improve post marketing surveillance on new and existing drugs and encourage drug safety practices. The unavailability of advanced health services and technological support to monitor, review and report adverse drug events constitutes several challenges for healthcare professionals with responsibilities towards pharmacovigilance among the general patient population. Increased rates of polypharmacy, prevalence of co-morbidities and wide spread use of herbal concoctions compounded by age-related physiological decline, pharmacodynamics and pharmacokinetics changes affecting drug metabolism contributes to increased ADRs observed in clinical practice in Nigeria.

According to the Department of health in 2016, 52.9% of men and 53.5% of women aged over 65 reported chronic illness or other health problems (Hilliard, 2017). This presents significant implications on healthcare demands and expenditure required for the monitoring and reporting of ADRs necessary to enhance an understanding of drug safety issues and to promote drug safety practices among healthcare professionals. Drugs used to treat chronic diseases, reduce pain and improve health

outcomes and quality of life are critical in the healthcare management of patients. The most common classes of drugs that causes ADRs in the general patients are gastrointestinal drugs, cardiovascular drugs, anticancer drugs and anti-inflammatory drugs with the most common ADRs being neurological conditions, dermatological reactions and gastrointestinal disturbances such as diarrhoea and vomiting. Others include oedema, nausea, drowsiness, headache, fatigue and malaise. Obviously, this like other adverse events in the health industry significantly adds strain to the health care resources of any community. Presently, just about one-third of hospitalised patients are due to adverse reactions of the drugs while other reasons include health deteriorations and side effects of drugs.

In a publication titled Pattern of medications causing adverse drug reactions and the predisposing risk factors among medical in-patients in clinical practice: A prospective study, the authors established that multiple body systems and organs were usually affected by ADRs. The neurological system was the most frequently affected system noted in 169 making about 33.3% of patients studied. It was closely followed by the gastrointestinal system noted in 110 (21.6%) patients, the dermatological system in 89 (17.6%) patients, and cardiovascular system in 40 (7.8%) patients. The endocrine, respiratory, and renal systems were equally affected in 20 (3.9%) patients each. (Akhideno *et al.*, 2019)

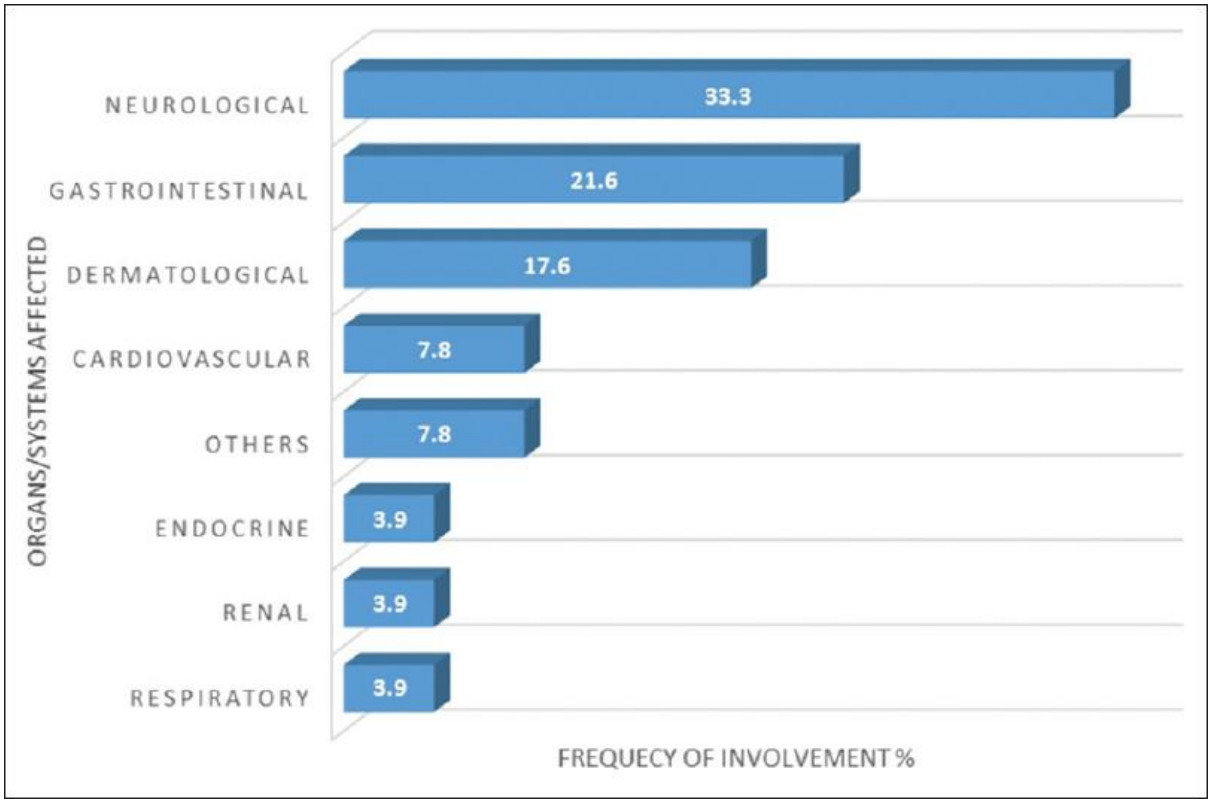

Figure 5: Frequency of ADR involvement and body organ/system affected. (Akhideno *et al.*, 2019)

2.3 Pharmacovigilance and Adverse Drug reactions reporting

Pharmacovigilance is a practice that detects, assesses or prevents any drug related issue or associated adverse events to maintain the continuous monitoring of medicines for patients' safety. To achieve this, ADR reports, clinical trial results and epidemiological studies must be regularly evaluated. Since the pharmaceutical industry and regulatory bodies have the patients' well-being as their main concern, good pharmacovigilance and post-market surveillance practices helps to improve patient health outcomes and contribute towards future clinical research and drug development. (Talbot and Nilsson, 1998).

A paper published in 2012 was aimed at investigating the knowledge and attitude of resident doctors towards ADR reporting while suggesting possible ways to improve it. They encouraged pharmacovigilance which helps to detect and identify ADRs and

their associated risk factors and that the issue of under reporting can be improved by making healthcare professionals more knowledgeable about pharmacovigilance. Using a cross-sectional questionnaire-based survey, respondents who were all resident doctors provided information which were considered for analysis. With a response rate of 93.3% from a total of 84 questionnaires, 64.3% admitted to being aware of pharmacovigilance, 52.4% were aware of ADR reporting system in India, 83.3% suggested that only serious ADR should be reported while 35.7% believed that ADRs should be reported only for newly authorised and marketed drugs. Even though about 67.9% of responders admitted having observed ADRs only 25.0% reported it. 44.0% were aware of the complete procedure involved with ADR reporting. The general attitude towards ADR reporting were denoted by 15.2% who felt it should be compulsory, 41.7% suggested it should be voluntary, 3.6% felt it should be remunerated, 21.4% suggested that the identity of the prescriber should be concealed, and 29.7% wanted the identity of the reporter concealed. From the results, the authors concluded that an increase in awareness of pharmacovigilance will help improve ADR reporting as well as having ADR reporting guidelines available in booklets and displayed as posters. (Pimpalkhute *et al.*, 2012)

Reporting of ADRs is a significant hallmark of pharmacovigilance. Over the last half of a century, spontaneous reporting systems such as the yellow card scheme in the UK has continued to be the most reliable method of detecting and reporting ADRs. This scheme was founded in 1964 after the thalidomide tragedy occurred in the late 1950's. This is operated by the Medicines and Healthcare Products Regulatory Agency (MHRA) and the Commission on Human Medicines (CHM). Through spontaneous reporting, data can be collected on suspected ADRs for both licensed and unlicensed medicines and vaccines either through prescriptions or those bought over the counter. A typical report is said to be valid when it contains four vital items of information: an identifiable patient, an adverse reaction, a suspected medicinal product, and an identifiable reporter. It is also encouraged to give additional

information where possible to give better clinical context for regulatory assessors of such reports. (Coleman and Pontefract, 2016)

Spontaneous reporting systems which have been widely utilised for pharmacovigilance are very effective when the adverse event is rare, uncommon (observed in less than 1.0% of treated cases) and event is typical of a drug-induced condition. They are limited when used to identify a small increase in the rate of common events like a stroke or myocardial infarction. The Clinical Practice Research Datalink (CPRD) presents an opportunity to analyse drug exposures and potential adverse events in such databases. They are anonymous UK primary care records which can help in supporting or refuting the existence of potential signals. Other alternative data sources utilised for pharmacovigilance includes formal drug safety studies, published data, pharmaceutical company data from periodic safety update reports and shared international data. (Coleman and Pontefract, 2016)

2.4 Who is responsible for Reporting Adverse Drug Reactions?

Healthcare professionals (medical doctors and pharmacists) are the primary reporters encouraged to report ADRs observed during their practice and involvements with patients. As noted in a survey conducted by the European Commission (EC), about 5.0% of hospital admissions in Europe are due to ADRs while 5.0% of hospitalised patients experience an ADR during their time on admission. ADRs represent the fifth most common cause of death in the hospital setting, resulting in about 200,000 patient mortality in the European Union (EU) alone yearly. The healthcare cost burden of these ADRs in the EU was approximately €80 billion in 2008. (Giardina *et al.*, 2018). Since the clinical trials are usually limited in the studies about a medicine's safety until it is introduced into the market and widely used by patients and consumers, it is imperative that the responsibility to report ADRs among healthcare professionals be properly determined to provide a basis for further research and drug investigations. (HPRA, 2019)

In Ireland, the Health Products Regulatory Authority (HPRA) oversees the duty of operating the national adverse reaction reporting system and monitoring for drug safety. The information generated from pharmacovigilance helps in updating notifications on drug labelling, analysing drug-risk patterns, and encouraging additional investigations to prevent these adverse drug reactions. The newly generated data helps to foster appropriate regulatory modalities that guides drug researchers, healthcare professionals and pharmaceutical companies. (Council for International Organisations of Medical Sciences, 2000)

Medical doctors and pharmacists are the earliest healthcare professionals to have contacts to the hospitalised patients and are expected to report ADRs observed from newly authorised or old drug products and vaccines which have been listed as require further monitoring. (Steinman *et al.*, 2011). This highlights the importance of drug safety assessments for healthcare professionals during daily patient management reviews for hospitalised and out-patients. An awareness of the pharmacology (pharmacodynamics and pharmacokinetics) and toxic profiles of administered drugs is critical in observing for ADRs in order to adequately report them for guidance and follow up support. (HPRA, 2018)

2.5 Challenges Faced Among Healthcare Professionals in Reporting Adverse Drug Reactions

In relation to challenges in reporting ADR, the language problem is very persistent. Clinicians communicate verbally with one another and with their patients. When reporting ADRs or their suspicions, physicians will most times be reporting a clearly defined or well-known disease. But the challenge is that many of the terms used in reporting bear different meanings in different medical settings. In order not to corrupt the information obtained at the primary source, it is encouraged not to use terms different from what the patient used except there is an acceptable reason to

do so or there is a clear, precise and well-established definition given in medicine textbooks. For example, in the Prescription-Event Monitoring Program, there was an obvious difference in the terms used by the patients and those the clinicians were inclined to impose when referring to a patients' complaint of persistent dry cough. As a result, while framing initial reports of ADRs, the character of the clinical complaint and its nature can be lost. (Council for International Organisations of Medical Sciences, 2000)

A research article titled Perceptions of doctors to adverse drug reactions reporting in a teaching hospital in Lagos, Nigeria was aimed at evaluating the knowledge and attitudes of doctors in a teaching hospital regarding spontaneous reporting in Lagos, Nigeria and to draw up suggestions geared towards improving this method of reporting. This study was carried out with a total of 120 medical doctors working at the Lagos State University Teaching Hospital (LASUTH) in Nigeria who were evaluated using a questionnaire to ascertain their knowledge and attitudes to ADR reporting, factors which they perceived may influence ADR reporting, and levels of education and training on ADR reporting. The study highlights factors that result in ADR under reporting among healthcare professionals which were broadly categorised as personal and professional characteristics of healthcare professionals and their knowledge and attitude towards reporting. They highlighted factors such as legal aspects involving the fear of litigation, problems associated with knowledge and attitude to ADRs, complacency resulting in the belief that serious ADRs have already been well documented by the time a drug is authorised and being circulated in the market, financial incentives resulting in expectation of rewards towards professional activities and for reporting ADRs, diffidence which tends to suggest that reporting an ADR is only worth doing if there was absolute certainty that it was related to the use of a specific drug, indifference that contributes to the belief that a single case of ADR an individual healthcare professional might observe could not significantly contribute to medical knowledge or make a difference to national drug safety practices, ignorance suggesting that it is only necessary to report serious, life-threatening and

unexpected ADRs, lethargy involving procrastination and lack of enthusiasm towards ADR reporting or just a sheer lack of time and will power to find a report card as well as other applicable excuses. (Oshikoya and Awobusuyi, 2009)

Of the factors listed from a global perspective, a review of the determinants of ADR under reporting associated with the healthcare professionals suggests that financial incentives, fear and ambition to publish contributed less significantly to under reporting. However, the factors resulting in the under reporting of ADRs in Africa have not yet been extensively studied. According to the authors, only two previous studies have attempted to analyse these factors in African countries, one of which indicates inadequate knowledge among resident doctors about ADRs, hence the aim of this study. The questionnaire was the method used to seek the necessary information. The response rate was 82.5% with most of the respondents about 89.9% who considered doctors as the most qualified healthcare professional to report ADRs. 40 of the respondents making about 40.4% were aware of the National Pharmacovigilance Centre (NPC) in Nigeria. 32.3% of the respondents were aware of the Yellow card reporting scheme but only two of them had ever reported ADRs to the NPC. Only about half of the respondents constituting about 48.5% felt that all serious ADRs could be identified after the drug has been licensed, authorised and marketed. There was a marked difference among the number of respondents who believed ADR reporting should be compulsory as opposed to it being voluntary. (Oshikoya and Awobusuyi, 2009)

The conclusion of the study disclosed the inadequacy of knowledge of medical doctors regarding ADRs and its reporting which was like reports among doctors not just in Nigeria but also across Europe, Asia and America. This highlighted the need for better undergraduate training towards pharmacovigilance and medicine risk perceptions as they are either insufficient or inadequately delivered to prepare medical doctors for their responsibilities towards ADR monitoring and reporting through their careers. Education and training on spontaneous reporting and the use

of the yellow cards was highly recommended since only one of the respondents admitted to ever receiving such training. Although spontaneous ADR reporting among healthcare professionals was recommended by the NPC, it was highly unrecognised by the respondents. Most of them were not aware of the presence of the NPC while only about 39.2% of them correctly identified Abuja as the location of the office. Without proper knowledge of where to report ADRs, the rate of reporting would invariably remain poor, hence the need for heightened publicity through awareness programs to improve ADR reporting in Nigeria. The NAFDAC also needed to formulate a streamlined guideline for healthcare professionals to improve recognition and reporting of unusual ADRs. To improve ADR reporting over the long term, attitudinal and cultural changes must be imbibed which results in making ADR reporting an integral part of the clinical activities of the medical doctors. (Oshikoya and Awobusuyi, 2009)

A study 20 years ago on the reporting of ADRs by doctors studied 118 doctors and determined that only about 45.0% had ever reported an ADR, with the senior doctors more likely to submit an ADR incident report when compared to the junior doctors. Worthy of note is the fact that physicians were more positively predisposed to reporting ADRs than the surgeons. By continuously providing reminders to report ADRs and by improving accessibility of yellow cards for a three-month period, submitted ADR report rates increased five times. This improved rate declined after the reminders ceased, despite the availability of yellow cards suggesting that the availability of the yellow cards alone does not automatically translate to improved ADR reporting rates among healthcare professionals. (McGettigan *et al.*, 1997)

ADRs leads to patient complaints and can cause non-compliance with their prescribed drug regimen in future. They usually mask as morbid symptoms results in misdiagnosis and wrong investigations and management by the healthcare professionals. Another recent study in Cork-based teaching hospital, published an incidence rate of 8.8% for ADR-related hospital admissions. (Walsh *et al.*, 2014)

Polypharmacy is typical among older patients as one-fifth of people aged over 50 regularly take five or more medications daily. ADRs for drugs used to treat cardiovascular conditions are the most predisposed to cause ADRs. The hike in price for routinely prescribed Irish generic medications are massive, usually going for two to six times more when compared to neighbouring European countries (Richardson *et al.*, 2012).

However, the challenges emanating from the insufficient time and the inadequate sample size of subjects required for the clinical trial study is a huge challenge for pharmacovigilance. Recent pharmacovigilance practices are very dependent on post-market surveillance and spontaneous reporting of ADRs among the healthcare professionals, complemented by the patient or drug user. However, persisting poor reporting rates of ADRs remain a hinderance to establishing adequate ADR databases, despite the use of electronic health records considered as secondary sources for data. (Lardon *et al.*, 2015)

As published by St James hospital in Ireland, yellow cards method for the ADR reporting continues to be widely recognised as an efficient surveillance system for ADRs observed in clinical practice. They were formalised in the 1960's due to the thalidomide disaster which caused the WHO in 1968 to begin the International Drug Monitoring programme as a means of receiving ADR data from member countries contributing resources to improve evaluation of rare and serious reactions. (NMIC, 2005)

The value derived from the yellow card scheme is highly dependent on the healthcare professionals that prescribe, dispense or administer the medications. Despite the widespread acknowledgement of the importance of ADR reporting and the measures established to improve drug safety and pharmacovigilance practices among healthcare professionals, only few studies have explored the challenging factors limiting healthcare professionals towards ADR reporting.

2.6 Recommendations for Improvement of Adverse Drug Reaction Reporting

A recent study published in January 2019 on educational intervention to improve the knowledge, attitude and practice of healthcare professionals regarding pharmacovigilance in the southern parts of Nigeria was aimed at ascertaining the effect of a combined educational intervention. It involved delivering a seminar coupled with the sending of text messages monthly for a one-year duration on the knowledge, attitude and practice of healthcare professionals towards pharmacovigilance. They randomly selected six different teaching hospitals in the southern regions of Nigeria. This zone is made up of six states which includes Akwa-Ibom, Bayelsa, Cross-Rivers, Delta, Edo and Rivers State. They utilised a semi-structured questionnaire which was completed by healthcare professionals constituting of doctors, pharmacists and nurses working in these hospitals, from which appropriate data was gathered and analysed. The study was conducted from January 2016 to April 2017 and was designed as a repeated cross-sectional study with teaching hospitals which was randomised to intervention and control sites. (Opadeyi, Fourrier-Réglat and Isah, 2019)

There were 40 questions in total concerning the nature of ADR reporting practice- 12 questions evaluated the knowledge of the healthcare professional, 10 questions surrounded their attitudes and 18 focused mainly on their ADR reporting practice. The questionnaire contained and sought information such as age, duration of practice, sex, institution, knowledge of ADRs and associated definitions, reporting systems, and questions on the regulatory body responsible for pharmacovigilance and the location of the national centre for pharmacovigilance in Nigeria, perceptions towards pharmacovigilance, willingness to accept incentives for reporting, previous ADRs reported and ADR report form handling process and other associated reporting practices in their health institutions. (Opadeyi, Fourrier-Réglat and Isah, 2019)

A total of 811 healthcare professionals with 65.0% in the intervention arm and 35.0% in the control arms participated in the pre-intervention study which was carried out in 2016. The corresponding response rate was 70.8% while 931 healthcare professionals in the repeated cross-sectional study corresponded in a response rate of 77.6% with 64.0% for the intervention arm and 36.0% for the control arm. The participants of both the pre intervention and post intervention surveys were similar. From the analysis of the post intervention questionnaire, there was a distinct increase in knowledge across several items between the groups. The healthcare professionals from the intervention group were better informed with improved knowledge that ADRs can result from the pharmacological attributes of the drug, can persist for a long time and can also occur with newly licensed and marketed medicines, vaccines and biological drug products. As regards knowledge of what to report, most of the responders in the intervention group acknowledged that they were more likely to submit reports of life-threatening and serious ADRs. According to the information gathered from the post intervention questionnaire, there was a remarkable increase in awareness among the intervention arm of the existing southern zonal pharmacovigilance centre as well as the national ADR reporting form when compared to the control group. Further analysis of the post intervention questionnaire depicts that those respondents in the control arm still preferred the medical doctors to file ADR reports despite the belief that all categories of healthcare professionals could make a report of ADRs. (Opadeyi, Fourrier-Réglat and Isah, 2019)

Prior to the educational intervention, there was no significant difference in the attitude of reporting among both groups. In the post intervention questionnaire, respondents in the control group had significantly improved positive attitudes when compared to those from the intervention group in most of the recorded items, except for when they must report their suspicion of an uncertain ADR. However, the ideation on the relevance of reporting ADRs was not different between the groups. An increase of 24.0% was noted among the healthcare professionals in the

intervention group who had received training in ADR reporting when compared to 11.6% of those in the control group after the intervention. The proportion of healthcare professionals from the intervention group who had ever observed an ADR was markedly increased from 73.4% to 82.0%. Of the 188 who had ever reported an ADR, 41.0% from the intervention group admitted to using the national ADR reporting form compared with 19.8% from the controls. From the respondents of the intervention group who had ever reported an ADR using the national ADR reporting form, 18.6% were able to access the form when compared with 9.9% in the control arm. ADR reporting in the intervention group was also significantly higher and recorded 29.8% as against 18.7%. The authors concluded that the educational intervention resulted in an improvement in the knowledge and practice of pharmacovigilance and ADR reporting while better specific interventions would result in more improved attitudinal changes. A streamlined reporting process will further improve the practice of pharmacovigilance among healthcare professionals. (Opadeyi, Fourrier-Réglat and Isah, 2019)

A research paper published in 2016 on the knowledge and attitude of healthcare professionals towards pharmacovigilance and ADR reporting in Northern Cyprus was carried out with 90 community pharmacists, 98 nurses and 71 medical doctors to investigate the knowledge, attitude and perceptions of healthcare professionals towards pharmacovigilance and ADR reporting. Using a face to face questionnaire method, only 13.0% of pharmacists, 2.0% of nurses and 20.0% of the physicians had knowledge about pharmacovigilance. While most of these healthcare professionals could not define pharmacovigilance correctly, only the pharmacists and medical doctors mostly (77.8% and 97.2% respectively) could define ADR correctly as compared to 85.7% of nurses who could not. The medical doctors received more ADR complaints from patients (53.5%) when compared to pharmacists (32.2%) and nurses (11.5%), however medical doctors reported ADRs significantly less than pharmacists (10.3%) and nurses (3.3%). Sadly, none of the respondents had knowledge on how to

access the ADR reporting forms. The reasons cited for under-reporting included, time constraints, inadequate clinical knowledge of ADRs, where to report and how to report them, avoiding legal liability, ignorance on how to reach ADR forms and ADR reporting not being compulsory. The authors concluded that specific pharmacovigilance education would be the core solution to the lack of knowledge and attitude among healthcare professionals regarding under reporting and issues surrounding drug safety. There should be trainings to foster a mutual understanding and collaboration among healthcare professionals, leveraging on the competencies of each other. (Toklu *et al.*, 2016)

A 15-year review from 1983 to 1997 was conducted to evaluate reports of spontaneous adverse events by primary reporter composed mainly of healthcare professionals. They sought to explore whether a group of major primary reporter (healthcare professionals) categories including primary care physicians, pharmacists, consultants/specialist physicians, nurses and others had any impact on the quality and type of adverse event reports collected. A thousand spontaneous reports were generated randomly from the safety database across seven major categories of primary reporters. They also had another objective to ascertain the quality of the selected reports among the different reporters. But since the evaluation of the quality of information provided in the event report was rather subjective, an alternative objective method was used to evaluate the usefulness of the report by measuring the completeness of the data provided across the major fields such as demographics including age and sex of patient, dosing information including the dose, duration and indication as well as the general event description and information. (Hornbuckle, Wu and Fung, 1999)

According to their report, literature seemed to suggest that pharmacists were the most enthusiastic category of reporters of ADRs while physicians were more likely to submit a more complete, thorough and possibly more accurate report of adverse

drug events. They cited studies that suggested that physicians-in-training (residents and interns) were more predisposed to having a positive attitude towards pharmacovigilance and drug safety reporting when compared to more senior physicians. Also, among the categories of healthcare professionals who were primary reporters, those who worked in a hospital were more likely to inquire and report an ADR when compared to the same categories of healthcare professionals who were working in a rural community setting or an out-patient establishment. (Hornbuckle, Wu and Fung, 1999)

The worldwide safety database of the drug manufacturers was analysed for all post-marketing adverse drug event reports which had a clearly identifiable primary reporter among the seven categories being studied. The spontaneous reports submitted directly by healthcare professionals to the drug manufacturers or indirectly through the regulatory authorities were referred to as post-marketing adverse event reports. The time duration through which the 15-year reporting period was from March 1, 1983 to December 31, 1997 with a total of 89,592 identified post-marketing adverse event reports. The database covered a total of 135 different post-marketed drugs which were manufactured by the pharmaceutical companies across 42 therapeutic drug classes globally. (Hornbuckle, Wu and Fung, 1999)

From the results obtained, consultant/specialist physicians appeared to most commonly report serious adverse drug events with 30.4% of the 1000 reports followed by primary care physicians with 20.2%. Overdose events were most frequently reported by pharmacists with 4.6%. Pharmacists were also more likely to report cases of lack of drug effect and those of more allergic reactions more than other categories of reporters as they were expected to report more drug interactions due to their educational training and direct handling of medications.

As regards the completeness among the four data fields assessed, demographic and general event data appeared to be more complete among all the categories of

healthcare professional reporters analysed than for the concomitant and dosing fields. Primary care physicians in general provided the highest percentage of completion for all the data fields in the post-marketing adverse event reports. The study was concluded by noting that with a positive change and improvement in the knowledge and attitudes of healthcare professionals towards pharmacovigilance and drug safety and adverse events reporting, there will invariably be an impact in the quantity and quality of the adverse event report collected. The authors highlighted the importance of promoting programs that support adverse drug event reporting in order to improve their usefulness in pharmacovigilance and drug safety. (Hornbuckle, Wu and Fung, 1999)

An article published in 2014 titled Adverse Drug Event reporting: Awareness is not Enough, described the several post-marketing surveillance methods with the national voluntary reporting system being a critical component for collecting information concerning specific adverse events surrounding medications. In the United States, the Food and Drug Administration (FDA) handles a MedWatch program that collects voluntary reports from healthcare professionals and consumers about ADRs and other errors related to drugs, biologics, nutritionals and medical devices. The Vaccine Adverse Event Reporting System (VAERS) collect data concerning voluntary reports on adverse events from vaccines. This program is co-sponsored Food and Drug Administration and the Centre for Disease Control and Prevention (CDC). Other voluntary programs founded by the Institute of Safe Medication Practices: Medication Errors Reporting (ISMP MERP) and National Vaccine Reporting Program (ISMP VERP) all serve to allow individuals to confidentially report an incident for the analysis of data which helps to observe for potential trends, identify problems and provide information to optimise patient safety for the global health community. (Generali, 2014)

But the challenge of under reporting presents a limitation which results in a variance of the quality of reports received. This is because most of the national reporting programs depends on voluntary participation. But despite these limitations, the MedWatch, VAERS, and ISMP programs results in a positive impact on patient care by encouraging better drug safety practices. Continuous participation of healthcare professionals continue in the voluntary reporting of adverse drug events is essential in promoting patient and safety. The involvement of pharmacists in patient care and their role in ADR reporting requires that they have knowledge and awareness of these programs. But recent studies that evaluated the knowledge and attitude of US pharmacists regarding ADR showed that despite positive attitudes towards reporting, most pharmacists have never reported an adverse drug event to the MedWatch program or admit that their knowledge regarding the reporting mechanisms and systems is inadequate. The United States is not the only country facing same discrepancy as several international studies carried out document a lack of pharmacist awareness and experience with ADR reporting which invariably deters participation in similar national programs globally. (Generali, 2014)

In conclusion, the author determined that knowledge and awareness is not enough without the necessary experience in assessing ADRs and reporting same. She encouraged pharmacy schools and faculties to include ADR assessment and reporting experiences in their various didactic and experiential curricula. A training model can be used to improve familiarity with reporting mechanisms such as the newly released FDA's program called MedWatch Learn which has been directed at teaching healthcare professionals on how to complete the online FDA forms needed to report ADRs. (Generali, 2014)

Authors	Publication Year	Sample Size	Key Points from Article	Conclusion from article
Pimpalkhute et al	Evaluation of awareness about pharmacovigilance and adverse drug reaction monitoring in resident doctors of a tertiary care teaching hospital, 2012	84 questionnaires, response rate of 93.3%	52.4% aware of ADR reporting systems 25.0% had ever reported ADR 15.2% suggested ADR report should be compulsory 41.7% preferred it should be voluntary 3.6% opted for some renumeration.	Increase in awareness of pharmacovigilance will help improve ADR reporting
Oshikoya and Awobusuyi	Perceptions of doctors to ADR reporting in a teaching hospital in Lagos, Nigeria 2009	120 medical doctors, response rate 82.5%	89.9% considered doctors as most qualified to report ADR 40.4% aware of National Pharmacovigilance Centre 32.3% aware of yellow card reporting scheme Only two respondents ever reported ADR	Recommended better education, streamlined guideline and undergraduate training to improve knowledge and attitude towards ADR reporting
McGettigan et al	Study on reporting of ADRs by hospital doctors, 1997	118 hospital doctors	45.0% had ever reported an ADR. Physicians more likely to report ADR than surgeons.	Improved availability of ADR, additional reminders improved reporting by five times, however after withdrawal of reminders, reporting rates dropped.
Opadeyi, Fourrier-Reglat, Isah	Educational intervention to improve the knowledge, attitude and practice of healthcare professionals regarding pharmacovigilance in South-South Nigeria, 2019	811 healthcare professionals in pre-intervention study and 931 healthcare professionals in the post intervention study across six different teaching hospitals	24.0% increase in the intervention group of healthcare professionals after receiving training on ADR reporting. Of 118 who had ever reported an ADR, 41.0% admitted to using the national ADR report form, with only 18.6% being able to access the form.	Educational lectures, seminars and a simplified reporting process resulted in an improved knowledge and practice of ADR reporting, while targeted interventions caused positive attitudinal changes.

Toklu et al	Knowledge and attitude of healthcare professionals towards pharmacovigilance and adverse drug reaction reporting in Northern Cyprus, 2016	90 community pharmacists, 98 nurses and 71 medical doctors	13.0% of pharmacists, 2.0% of nurses and 20.0% of the physicians had knowledge about pharmacovigilance. Doctors received more ADR complaints but reported significantly less than pharmacists 10.3% and nurses 3.3%	Ignorance, work time constraints, legal issues, poor knowledge resulted in how reporting rates. Specific pharmacovigilance education would be the core solution to the lack of knowledge and attitude among healthcare professionals
Hornbuckle, Wu and Fung	Evaluate reports of spontaneous adverse events by primary reporter composed mainly of healthcare professionals, 1999	1000 spontaneous reports from the safety database across 7 categories of primary reporters	Pharmacists were the most enthusiastic category of reporters of ADRs while physicians were more likely to submit a complete and accurate report of ADRs. Physicians in training (residents and interns) had more positive attitude to ADR reporting than Senior physicians	Improved knowledge and attitude of healthcare professionals impacted the quality and quantity of ADR reports collected. Promoting support programs for ADR reporting also improved pharmacovigilance and drug safety practices.
Generali et al	Adverse Drug Event reporting: Awareness is not Enough, 2014		MedWatch, VAERS, and ISMP programs results in a positive impact on patient care by encouraging pharmacovigilance and better drug safety practices	Concluded that knowledge and awareness is not enough without experience in ADR reporting. Also encouraged pharmacy schools and faculties to include ADR assessment and reporting in the didactic and experiential curricula.

Table 3: Summary of publications from literature review

2.7 The Nigerian Approach to Pharmacovigilance

With the significant burden of communicable and non-communicable diseases plaguing Nigeria, there is a consequent high use of medication. As a result, there is a positive initiative by the government through its Ministry of Health, regulators and healthcare professionals on the need for drug safety. The National Pharmacovigilance centre (NPC) was birthed as a result of this need, situated as an arm of the National Agency for Food and Drug Administration (NAFDAC) to foster pharmacovigilance activities in the country by serving as a repository for reported ADRs while also liaising with other international organisations such as the World Health Organisation (WHO), US Food and Drug Administration (USFDA) and the European Medicines Agency (EMA). Nigeria was admitted into the WHO International Drug Monitoring Program in 2004 with the aim of advancing drug safety in Nigeria, promoting a policy to define the responsibilities of stakeholders in pharmacovigilance, increasing public participation in drug safety measures, and training healthcare professionals in the country. However, the extent to which these objectives have been achieved remains questionable.

The NPC has developed ADR reporting forms and guidance documents to foster adequate reporting of ADRs among healthcare professionals and market authorisation holders. In 2006, the National Drug Safety and Advisory committee (NDSAC) was inaugurated to review issues and provide expert perspectives on pharmacovigilance issues. The pharmacovigilance unit which was initially part of the Food and Drug Information Centre (FDIC) was eventually upgraded to a separate directorate in 2012 to handle post-marketing surveillance and pharmacovigilance issues. In 2013, zonal centres were established in the six geo-political zones in the country to facilitate and coordinate reporting from different parts of the country. The NPC receives and evaluates Individual Spontaneous Case Reports and disseminates information through quarterly newsletters to healthcare professionals. The national drug policy document issued in 1990 but revised in 2005 highlighted

drug safety issues, providing the implementation framework that serves as a guidance document for the operation of the system. The NAFDAC Act Cap N1 LFN of 2004 (amended) provides a legal backing for the activities carried out by the NPC. (Olowofela, Fourrier-Réglat and Isah, 2016)

The National Agency for Food and Drug Administration and Control through the National Pharmacovigilance Centre has channelled efforts to improve drug safety practices and ADR reporting among healthcare professionals. These measures include providing training and tutorial seminars for healthcare professionals and regularly conducting public health awareness programs with discussion sessions with stakeholders in pharmacovigilance to review past reports of ADR and encourage the participation of all healthcare professionals involved in the prescription, dispensing and administration of drugs to learn the ADR reporting processes and importance of reporting ADRs.

Figure 6: Diagram of pharmacovigilance system of operation in Nigeria

At present, reporting of ADRs is voluntary for healthcare professionals but only mandatory for market authorisation holders (MAH). The number of reports currently in the NPC database has increased to 16,222 reports between September 2004 and May 2015, although just about 11,000 reports have been updated to the WHO database. But despite the increased number of reports, Nigeria is yet to achieve the recommended optimal target of 200 reports per million population set by WHO. Inadequate recognition of ADRs, complex ADR reporting processes, lack of guidance materials, under-reporting, slow implementation of policies, fear of litigation or penalty, negative attitudes and lack of dedication to ADR reporting and pharmacovigilance at large, all negatively contribute to the low number of reports received by the NPC. Inadequate resources, infrastructural challenges, insufficient experts and lack of governmental support and goodwill to the pharmacovigilance sector made it difficult to maintain the tempo needed to surmount the challenges faced among these healthcare professionals in advancing ADR reporting in their clinical practices. (Olowofela, Fourrier-Réglat and Isah, 2016)

2.8 Conclusion

After a thorough study and corresponding review of literature on research papers and articles from Nigeria and all around the world, it is evident that the challenges surrounding ADR reporting among healthcare professionals continue to persist despite increased and sustained efforts towards pharmacovigilance by responsible regulatory authorities and health organisations to streamline reporting processes and educate healthcare professionals in Nigeria. The finding from the literature review carried out depicts an inadequate knowledge and poor attitude as the main factors posing challenge to improve rates of ADR reporting and quality of reports.

Among the healthcare professionals in tertiary healthcare centres and in university teaching hospitals, medical doctors are traditionally seen as the leaders of the healthcare management team which has somewhat translated to the erroneous

assumption that the bulk of responsibility towards reporting ADRs rests with them alone as they were regularly considered first among the list of primary reporters of ADRs. Pharmacists in comparison, although better trained to identify and report ADRs shy away from the responsibility as they are typically less involved in the management of patients in the teaching hospitals. With minimal roles revolving around dispensing already prescribed drugs by medical doctors from the hospital pharmacy, they feel less obligated to report ADRs, believing it is the responsibility of the physicians managing the patients. In contrast, pharmacists practicing in community pharmacies encounter more ADRs directly. With less stringent regulations regarding drug prescriptions in Nigeria, patients can easily access prescription as well as over the counter medications by simply walking into a community pharmacy, these pharmacists are better suited to encountering a significantly higher number of ADRs with new and existing drugs and can contribute more towards better spontaneous reporting of ADRs.

Some of the challenges highlighted among healthcare professionals towards spontaneous reporting of ADRs through the literature review includes: ineffective ADR reporting systems and models, lack of available resources committed towards pharmacovigilance, mass exodus of healthcare professionals away from the failing Nigerian healthcare system, lack of healthcare professionals skilled and trained in reporting processes, limited or no financial incentives, inadequate working environments, excessively long work time constraints, limited awareness of responsibility towards ADR reporting and poor knowledge of established guidelines and regulations.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Overview

Section. No	Primary Data	Part A	Part B
1	Approach	Quantitative analysis	Qualitative analysis
2	Philosophy	Positivism	Interpretivism
3	Source	Questionnaire: Microsoft forms app distributed online	Phone Interviews
4	Structure	5 sections made up of 23 questions	10 – 20 minutes of phone conversations
5	Subjects	Medical Doctors (53) Pharmacists (51)	Medical Doctors (5) Pharmacists (5)

Table 4: Research Methodology and Primary Data collection

3.2 Research Approach

To determine the challenges and factors limiting healthcare professionals from implementing ADR reporting and improving pharmacovigilance in Nigeria, the author applied a quantitative and qualitative research method by using questionnaire surveys and phone interviews.

The survey was distributed electronically to both medical doctors and pharmacists who made up the main research cohorts and were requested to answer and fill the survey questions. This enabled the author gather appropriate information and applicable data used for statistical analysis. The questions sought to decipher the general perceptions towards ADR reporting and ascertain awareness about existing ADR reporting models and procedures. By determining the similarity or difference in perception among medical doctors and pharmacists, the author was able identify how best to approach these two major classes of healthcare professionals and proposed a recommendation that is sustainable over the long term.

For the qualitative approach, phone interviews were conducted to understand the personal perspectives of highly experienced medical doctors and pharmacists towards ADR reporting in Nigeria, while getting their opinions on the current Nigerian pharmacovigilance system, the factors that they considered as challenges to implementing effective ADR reporting practices and recommendations for improvement which were feasible and sustainable.

The data collected after the analysis from both groups approached was compared to the literature findings in order to articulate the authors' concluding perspective on the study being carried out.

3.3 Research Philosophy

The philosophy underlying this research work was significantly that of positivism and interpretivism. It was implemented for this study with the aim of explaining information gathered from respondents which helped in predicting an applicable conclusion to the study conducted. The practical implication of this research was dependent on several quantifiable observations which helped in the statistical analysis of information gathered from respondents. The research aimed to progress through hypotheses and deductions as concepts being studied were easily measurable and required large numbers of randomly selected samples of medical doctors and pharmacists.

The medical doctors and pharmacists were provided a highly structured questionnaire from which data was collected, analysed and interpreted objectively. The author was independent of the study and there was no inclination for human interference or personal interests within the study and only concentrated on the facts available. The independence assumed in this research was enforced using an electronic survey option in order to maintain minimal interactions with the research participants while the research was carried out, instead of a face to face

questionnaire which presented the risk of bias and subjectivity, noting that the author is a medical doctor as well.

The adoption of interpretivism towards information obtained from a qualitative approach utilising phone interviews methods resulted in primary data that was shaped by personal perspectives and values of the healthcare professionals. These were inclined to be subjective, yet honest and as a result its reliability and general representation tended to be undermined as well. However, it was also associated with a high level of validity as the greater level of depth and expression obtained from the highly experienced healthcare professionals while discussing ADR reporting in Nigeria was trustworthy through the philosophy of interpretivism which was required to obtain appropriate results from the study.

3.4 Research Strategy

The strategy of the research was to evaluate the awareness, knowledge and practice of ADR reporting among medical doctors and pharmacists, to understand the challenges faced by them in improving ADR reporting rates and to promote sustainable pharmacovigilance practices in Nigeria. As evidenced from the literature review conducted, it was evident that there was no research aimed at understanding challenges faced by these major groups of primary reporters by comparing the attitude, knowledge and awareness of ADR reporting among both groups of healthcare professionals in Nigeria.

The medical doctors and pharmacists who received the survey questionnaire were initially informed of the purpose of the research project being conducted by the author as part of the academic requirements for the award of M. Sc in Pharmaceutical Business and Technology. The questionnaire was put together in an easy-to-answer format to address the peculiarities of the Nigerian healthcare professionals. It was administered to over 130 participants who were alumni

members of a Nigerian University college of medicine and school of pharmacy, successfully practicing across the 4 geographical regions of the country.

Survey questionnaire for Healthcare professionals:

The questionnaire consisted of 23 questions structured under 5 sections to satisfy the purpose of the study for the Nigerian healthcare setting and its healthcare professionals using the Microsoft Forms application. The questionnaire was distributed electronically, and survey was completed in the absence of the author. This reinforces the philosophy of positivism to encourage the expression of opinions without any form of bias and hesitation.

The first question was presented with an introductory letter which was designed to gain consent from respondents, permitting the use of their answers for the purpose of the research study. They were assured that the data generated from the survey was handled in line with general data protection regulation (GDPR) and that their response was kept strictly confidential. The question had to be answered before the respondent could participate further in the survey.

3.5 Collection of Primary Data

As described in the research strategy, primary data was collected solely using questionnaires, created for both medical doctors and pharmacists as the groups of healthcare professionals considered for the study. All 23 questions were structured to ascertain the opinions of healthcare professionals in Nigeria to successfully achieve the research objectives without any apparent gaps.

Section 1 on demographics contained five questions with specified options provided for the respondents to choose from. The questions were to determine the category of healthcare professional and their level of experience and length of practice in the healthcare sector, the age group they fell into and which geographical zone of the country they currently practiced.

Section 2 on knowledge of ADR reporting, and its systems in Nigeria consisted of five questions aimed at gathering information on ADRs knowledge, methods of reporting and criteria for submitting an ADR report and knowledge of organisation responsible for pharmacovigilance in Nigeria.

Section 3 on awareness of ADR reporting in Nigeria consisted of five questions aimed at ascertaining the extent to which healthcare professionals understood ADRs, and who was responsible for its reporting. This included questions on the experience of reporting, mandatory or voluntary options for reporting and the frequency of reports, awareness of where to submit a report and the regulations and guidelines regarding ADR reporting in Nigeria.

Section 4 on factors that posed as challenges relating to ADR reporting consisted of questions to determine the perception of healthcare professionals which limits adequate reporting rates in Nigeria and pharmacovigilance practice.

Section 5: This consisted of questions that aimed to ascertain the respondents' opinion on provided recommendations for healthcare professionals on how to improve ADR reporting and its system in Nigeria.

3.6 Sources

The survey questionnaire generated was distributed to groups of healthcare professionals over the internet using Microsoft forms application. The author gathered information from 104 participants comprised of 53 medical doctors and 51 pharmacists. The author further utilised the Microsoft excel sheet to evaluate the information collated and produced pie and bar charts used to articulate and present the findings as well as to compare the responses between both groups of healthcare professionals.

Additionally, phone interviews were performed with highly experienced medical doctors and pharmacists for better understanding of the knowledge, awareness,

challenges encountered and recommendations for improvement towards ADR reporting in Nigeria.

Selection of medical doctors:

Author contacted his professional alumni forum of medical doctors from his alma mater in Nigeria where he explained the research topic which was aimed at exploring the challenges faced by healthcare professionals in Nigeria in relation to ADR reporting by determining the factors affecting their knowledge, attitudes and perception surrounding the issue. As a result, the medical doctors demonstrated a positive interest to partake in the survey questionnaire as well as an encouraging disposition to reach out for phone interviews which were successfully carried out as well.

Selection of pharmacists

Author reached out to the professional alumni forum of pharmacists from his alma mater in Nigeria, where he explained the relevance of the research topic and received positive feedback and interest to take part in the survey questionnaire and received recommendations for highly experienced pharmacists who were willing to participate in the phone interviews as well.

3.7 Access and Ethical Issues

A brief introductory explanation of the research topic was provided to all the healthcare professionals partaking in the survey questionnaire and interviews as they were all duly informed about the research project as part of an academic requirement by the author in fulfilment of his masters' program.

In structuring the questions contained in the survey, caution was taken to ensure no question requested any personal information of the respondent and that the questions posed were strictly relevant to the research study and its objectives. It was clearly noted to be a voluntary participation during which the participants had full prerogative to partake or not partake in the survey and were permitted to withdraw from participation at any time.

3.8 Inclusion and Exclusion Criteria

The healthcare professionals included in this study were medical doctors and pharmacists who were considered by the author as the main primary ADR reporters among healthcare professionals in Nigeria. The participants who declined to answer the questionnaire were by default considered as excluded from the study. Apart from these, no other specific inclusion or exclusion criteria was established in the enrolment of participants for this study and subsequent data analysis.

An introductory letter was attached to the survey questionnaire with a required answer for their informed consent before proceeding. It was at the sole discretion of the healthcare professional to either participate or withdraw from the survey exercise. Of the groups of professionals who received the link to the questionnaire, those who were unwilling to participate were encouraged to ignore the forwarded link while those who submitted a completed questionnaire were implied to have participated voluntarily.

3.9 Conclusion

For the research study, a quantitative and qualitative approach using survey questionnaires which consisted of 23 questions was distributed across two major cohorts of healthcare professionals and was underlined by a positivism philosophy which ensured an objective deduction from the measurable facts obtained. Phone

interviews were carried out for qualitative approach which allowed for better insights and perspectives on the research study.

The data collected was analysed and compared to the findings obtained during the literature review carried out in the previous chapter. The author hoped to ascertain the knowledge, attitudes and perceptions of medical doctors and pharmacists needed to evaluate the challenges faced by Nigerian healthcare professionals relating to ADR reporting, which was necessary to improve pharmacovigilance and drug safety practices in Nigeria.

The findings and analysis based on the responses generated is presented in the subsequent chapter.

CHAPTER 4: FINDINGS AND ANALYSIS

4.1 Overview

This chapter provides an avenue for the answers generated from the survey questionnaire to be analysed accordingly. The insights generated from the data assisted the author to determine the knowledge, awareness and challenges faced by these healthcare professionals and provided the basis for conclusion of the research study needed to improve ADR reporting in Nigeria.

The analysis from phone interviews conducted with highly experienced medical doctors and pharmacists helped to establish any overlap with survey questionnaire results, literature review and the personal perspective of the author regarding ADR reporting among healthcare professionals in Nigeria.

4.2 Demographic Data (Questions 1 – 6)

4.2.1 Response rate:

The survey was distributed to 140 healthcare professionals, consisting of 70 doctors and 70 pharmacists resulting in a total of 104 accepted responses, a response rate of 74.2%.

A total of 53 participants who responded were medical doctors with 36 of them being were male and 17 being female while in comparison, a total of 51 respondents were pharmacists, 24 of which were male and 25 being female.

The improved response rate was attained after text message reminders were sent out at regular intervals through the time allotted. The author noticed that more responses were usually received immediately after the text message reminders were sent.

4.2.2 Level of experience:

Out of the acceptable 104 respondents who completed the questionnaire, 75 respondents were predominantly young adults aged between 18 to 30 years. 26 respondents were aged between 31 to 40, two respondents were aged between 41 to 50 and just one respondent was 51 years or older.

Many of the respondents- 39 medical doctors and 36 pharmacists who participated in the survey questionnaire had between one to five years of experience with only one medical doctor and one pharmacist having over 10 years of experience.

Healthcare Professionals	Geographical Distribution				Years of Experience				Gender			Total Number of Respondents	Response Rate
	N	S	E	W	<1	1 - 5	6 - 10	>10	M	F	U		
Medical Doctors	15	12	13	13	9	39	4	1	36	17	0	53 out of 70	75.7%
Pharmacists	13	4	7	27	9	36	5	1	24	25	2	51 out of 70	72.9%

*Key: N=North; S=South; E=East; W=West; M=Male; F=Female; U=Undisclosed

Table 5: Demographics

4.3 Adverse Drug Reaction (ADR) Reporting- Knowledge (Questions 7 – 11)

The responses generated from this section were varied and remarkable. It was apparent from the survey that the knowledge base of the survey participants was encouraging and positive.

Question 7:

In the analysis of the participants knowledge on how to report ADRs in Nigeria, 80.0% of respondents (35 medical doctors and 48 pharmacists) admitted to knowing how to report ADRs while 20.0% of respondents (18 medical doctors and three pharmacists) did not know how to report ADRs in Nigeria – see Figure 7a.

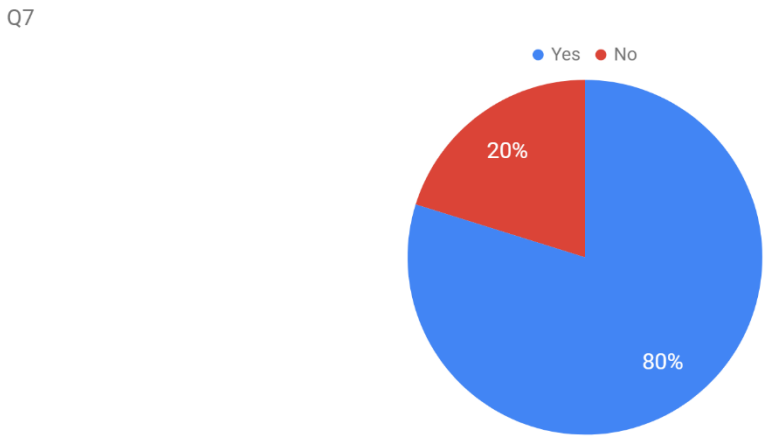

Figure 7a: Knowledge among healthcare professionals about reporting ADRs in Nigeria

It is interesting to note that among the respondents who participated in the survey, 34.0% of medical doctors did not know how to report ADRs compared to just 5.9% of pharmacists – see Figure 7b.

This confirms that while there is an above average knowledge among healthcare professionals in Nigeria on how to report ADRs as depicted from the survey, pharmacists are overwhelmingly more knowledgeable than their medical doctor counterparts as it pertains to ADR reporting.

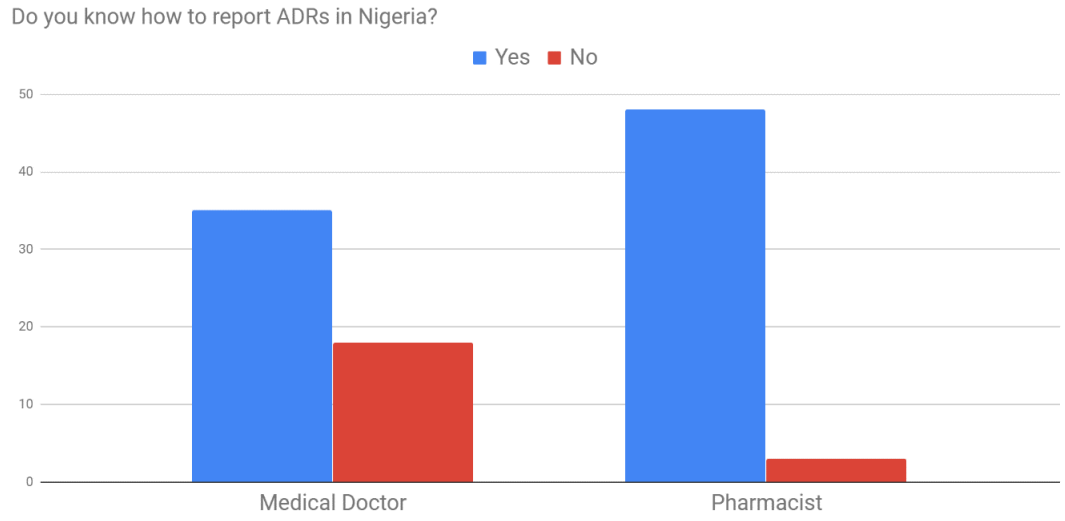

Figure 7b: Knowledge difference between doctors and pharmacists about reporting ADRs in Nigeria

Question 8:

As a follow-up to question 7, this was to ascertain the source of knowledge among healthcare professionals for reporting ADRs. While 19.0% of respondents opted not to answer, 31.0% of respondents (14 medical doctors and 18 pharmacist) admitted to getting ADR reporting knowledge from professional textbooks and journals, 27.0% of respondents (14 medical doctors and 14 pharmacists) participants from verbal communication with colleagues, followed closely by 19.0% of respondents (seven medical doctors and 13 pharmacists) with knowledge from newsletters received from regulatory authorities. Only 4.0% of respondents (two medical doctors and two pharmacists) attributed their source of knowledge to the internet and social media – see Figure 8.

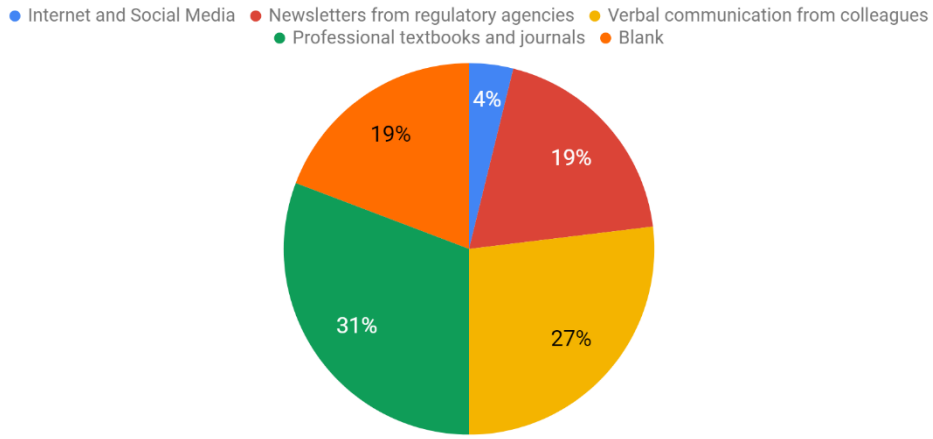

Figure 8: Source of knowledge for ADR reporting

This shows that medical doctors and pharmacists in Nigeria utilise peer-to-peer verbal communication and professional journals as their main source of knowledge for ADR reporting. Pharmacists are more inclined to source knowledge from the NAFDAC newsletters than medical doctors. However, despite the upward trend of the internet and social media, very few healthcare professionals explore this source for knowledge on ADR reporting.

Question 9:

In order to determine the knowledge of which organisation is responsible for handling ADR reports and pharmacovigilance in Nigeria, an overwhelming majority 75.0% of respondents identified the Nigerian Agency for Food and Drug Administration and Control (NAFDAC) when asked. 17.0% of respondents (11 medical doctors and seven pharmacists) selected the Pharmacists Council of Nigeria (PCN) while 3.0% of respondents (two medical doctors and one pharmacist) selected Medical and Dental Council of Nigeria (MDCN). 5.0% of respondents (three medical doctors and two pharmacists) selected the World Health Organisation as being responsible for pharmacovigilance and handling ADR reports in Nigeria – Figure 9.

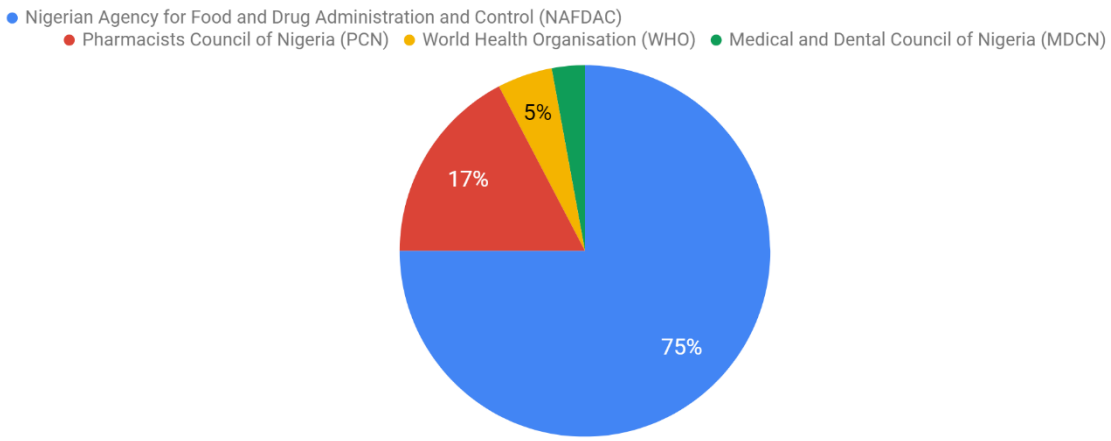

Figure 9: Organisation responsible for handling ADRs in Nigeria

As confirmed by the survey result, while few medical doctors and pharmacists incorrectly selected the Pharmacists Council of Nigeria as the responsible body, an overwhelming majority of the healthcare professionals correctly recognised NAFDAC as the primary regulatory authority responsible for pharmacovigilance and handling ADR reports in Nigeria.

Question 10:

In ascertaining the ADR method that is familiar to Nigerian healthcare professionals, 39.0% of respondents (eight medical doctors and 33 pharmacists) selected yellow cards/ADR forms, 11.0% of respondents (eight medical doctors and three pharmacists) selected the ADR e-reporting form while 25.0% of respondents (15 medical doctors and 11 pharmacists) were familiar with both methods. However, 25.0% of respondents (22 medical doctors and four pharmacists) were unfamiliar with any of the methods for reporting ADRs in Nigeria.

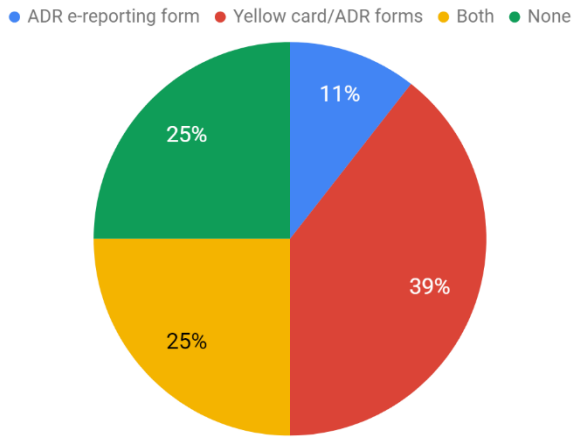

Figure 10a: Familiar methods of reporting ADRs in Nigeria

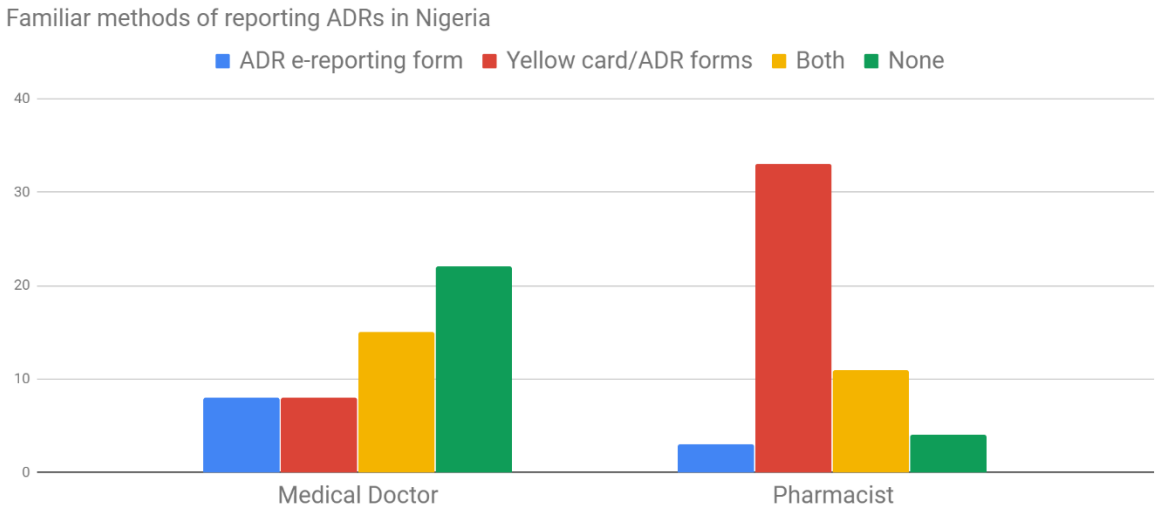

Figure 10b: Familiar methods of reporting ADRs in Nigeria

As depicted in the charts in Figure 10b above, medical doctors were worse than pharmacists as regards the familiarity of ADR reporting methods. Most of the medical doctors who responded were unfamiliar with either the yellow cards, ADR forms or the ADR e-reporting form. While in contrast almost all pharmacist respondents were familiar with at least one method which is the Yellow card/ADR form. There was generally a poor familiarity of the ADR e-reporting form available on the NAFDAC website among both groups of healthcare professionals studied.

Question 11:

In asking for the most important criteria to be considered for submitting ADR report, 10.0% of respondents (seven medical doctors and three pharmacists) selected unusual reactions, 2.0% of respondents (one medical doctor and two pharmacists) selected new drug product reactions, 7.0% of respondents (four medical doctors and three pharmacists) selected serious/life-threatening reactions while 81.0% of respondents (41 medical doctors and 43 pharmacists) admitted to all the listed options as being important to submit an ADR report.

As depicted from the answers received, most of the medical doctors and pharmacists correctly identified serious/life-threatening reactions, unusual reactions and new drug product reactions as all being equally important when deciding on criteria to submit an ADR report.

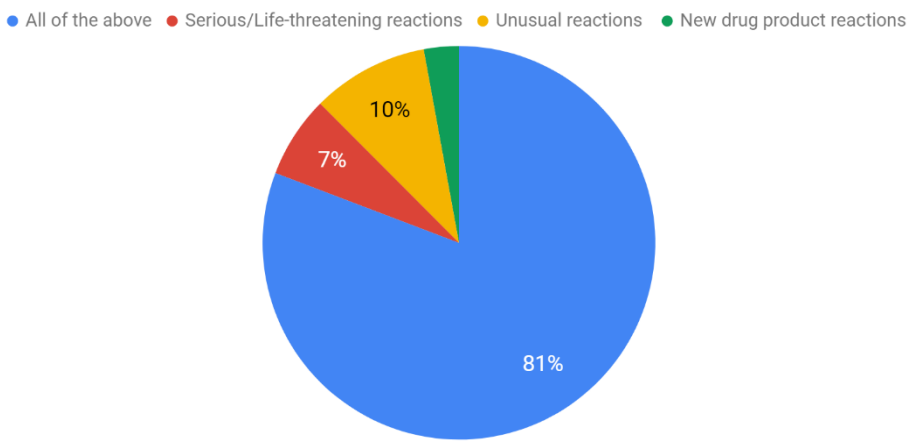

Figure 11: Most important criteria for submitting an ADR report

4.4 Adverse Drug Reaction (ADR) Reporting- Awareness and experience (Questions 12 – 21)

The responses from this section varied across the questions posed to ascertain the awareness and experiences of ADR reporting among healthcare professionals.

Question 12:

In analysing which healthcare professional was perceived to be mainly responsible for reporting ADRs, an overwhelming majority, 63.0% of respondents (40 medical doctors and 26 pharmacists) admitted that any of the healthcare professionals can be responsible for ADR reporting. 13.0% of respondents (12 medical doctors and one pharmacist) selected medical doctors while 24.0% of respondents (one medical doctor and 24 pharmacists) selected pharmacists – see figure 12a.

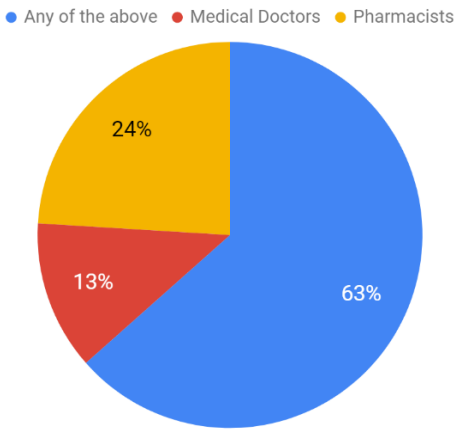

Figure 12a: Who is mainly responsible for reporting ADRs in Nigeria?

Interestingly, while most medical doctors and pharmacist correctly identified that any group of healthcare professional were equally responsible for reporting ADRs in Nigeria. Many pharmacists when compared to medical doctors still believed the main responsibility of reporting ADRs erroneously lies with their profession alone – see Figure 12b.

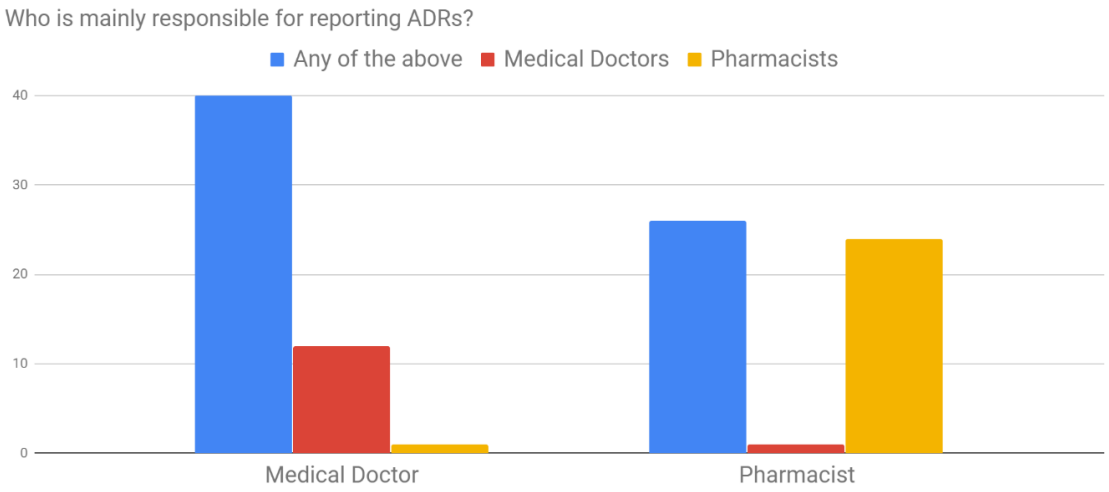

Figure 12b: Who is mainly responsible for reporting ADRs in Nigeria?

Question 13:

Interestingly, an overwhelming 90.0% of respondents (47 medical doctors and 47 pharmacists) felt ADR reporting should be compulsory in Nigeria compared to 10.0% of respondents (six medical doctors and four pharmacists) who suggested it remained voluntary – see Figure 13.

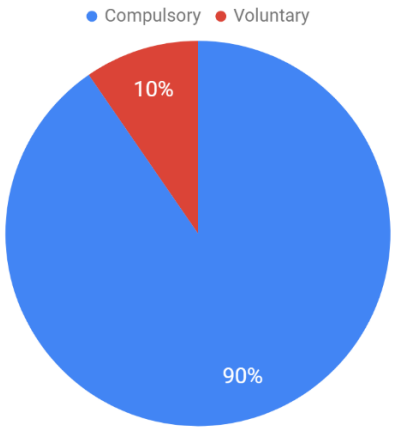

Figure 13: Should ADR reporting be compulsory or voluntary

Both groups of healthcare professionals clearly would opt for ADR reporting to be made compulsory like a professional obligation in Nigeria, depicting a favourable disposition to the importance of ADR reporting.

Question 14:

In order to determine observed ADRs and the frequency of such observations, 73.0% respondents (39 medical doctors and 37 pharmacists) admitted having observed an ADR within the past 12 months while 24.0% of respondents (13 medical doctors and 12 pharmacists) had not observed any within their practice. Only 3.0% of respondents (one medical doctor and two pharmacists) were unsure.

Both groups of healthcare professionals overwhelmingly admitted having observed ADRs in their practice within the past 12 months.

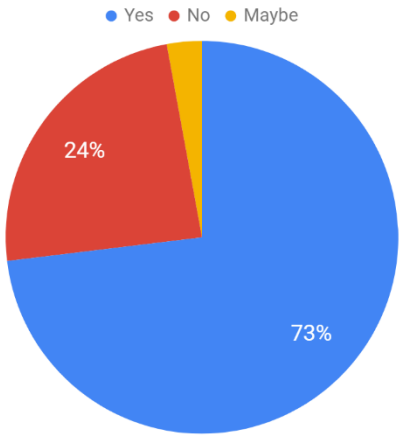

Figure 14: Have you observed ADR within the past 12 months

Question 15:

As with the high number healthcare professionals with positive responses to observed ADRs from the previous question, 73.0% of respondents (40 medical doctors and 36 pharmacists) recorded that they have observed less than 25 ADRs in the same time period. Only 5.0% of respondents (five pharmacists) had observed more than 25 ADRs in the past year. Interestingly, 22.0% of respondents (13 medical doctors and 10 pharmacists) provided no answer to the question.

As a follow-up from the response of the preceding question, this suggests a moderate frequency of observed ADRs among both groups of healthcare

professionals practicing in Nigeria, with the pharmacists more likely to observe higher numbers of ADRs in their practice than the medical doctors.

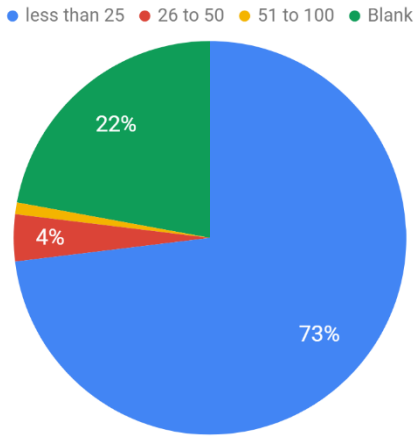

Figure 15: Average ADRs observed within the past 12 months

Question 16:

Interestingly, 36.0% of respondents (10 medical doctors and 28 pharmacists) admitted having reported an ADR within the past 12 months, especially when compared to the high number of healthcare professionals who had observed ADRs in the same time period. The majority 57.0% of respondents (40 medical doctors and 19 pharmacists) indicated not to have reported an ADR in the past 12 months while 7.0% of respondents (three medical doctors and four pharmacists) were unsure if they did – see Figure 16a.

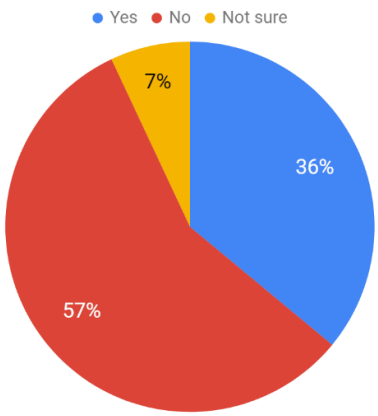

Figure 16a: Reported an ADR in the past 12 months

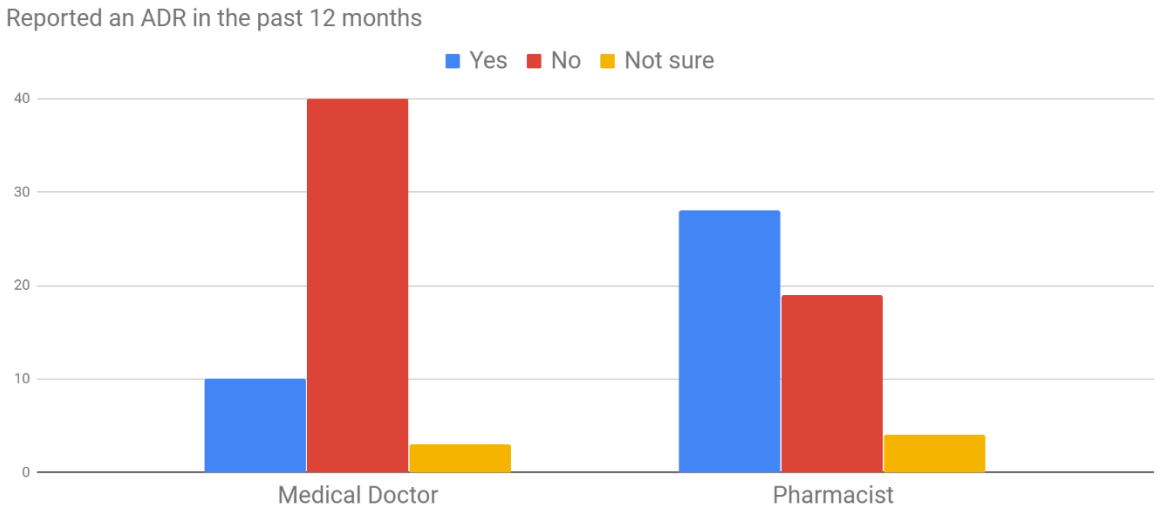

Figure 16b: Reported an ADR in the past 12 months

As depicted from the responses generated, most medical doctors had not reported any ADR within the past 12 months when compared to the pharmacists who had better ADR reporting in the same time frame. With the average number of ADRs regularly observed in practice among both groups of healthcare professionals, it is evident that the attitude towards reporting is poor in Nigeria.

Question 17:

In the analysis of number of ADRs reported on average within the past 12 months, 40.0% of respondents (20 medical doctors and 22 pharmacists) admitted to have reported less than five ADRs within that time period, 7.0% of respondents (one medical doctor and six pharmacists) reported between six to 10 ADRs and just 3.0% of respondents (three pharmacists) reported 11 to 20 ADRs. However, an overwhelming 50.0% of respondents (32 medical doctors and 20 pharmacists) did not respond to the question. It is important to note that no participant reported more than 20 ADRs within the past 12 months according to this survey.

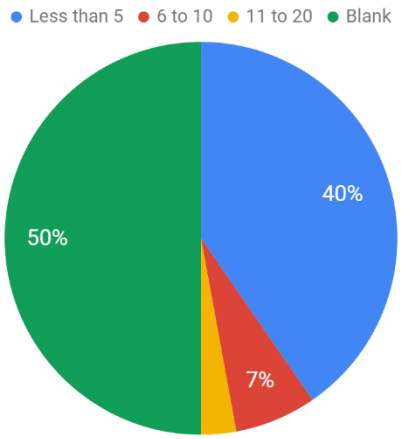

Figure 17: Average ADRs reported in the past 12 months

The answers received further strengthens the fact that most healthcare professionals who responded had submitted significantly less ADR reports within the past 12 months when compared to the number of ADRs observed in the same time frame.

Question 18:

In the analysis of where healthcare professionals submit their ADR reports, 36.0% of respondents (11 medical doctors and 26 pharmacists) submitted an ADR report to the nearest pharmacovigilance centre, 10.0% of respondents (eight medical doctors and two pharmacists) submitted to their professional associations while 14.0% of respondents (seven medical doctors and eight pharmacists) admitted to reporting to the pharmaceutical company or drug manufacturer. Interestingly, the majority totalling 40.0% of respondents (27 medical doctors and 15 pharmacists) admitted to submitting to other sources. This is a critical gap in the survey which would be further explored during the phone interviews with experienced medical doctors and pharmacists for qualitative analysis of this research study.

This demonstrates a discrepancy among both groups of healthcare professionals as regards their knowledge and awareness of where ADR reports are meant to be submitted. Pharmacists were more aware of the National Pharmacovigilance Centre

located in their geographical zone and submitted their ADR reports to them. In contrast, medical doctors mostly reported to other unspecified options.

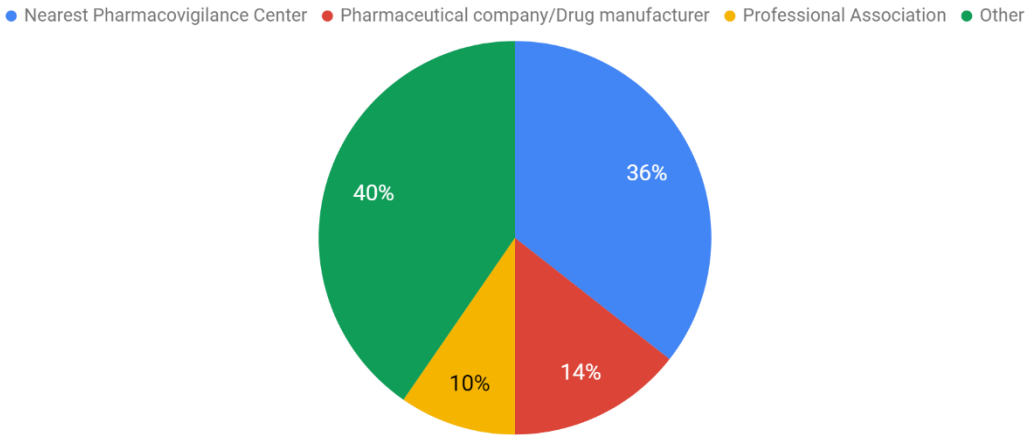

Figure 18a: Who did you submit ADR reports in Nigeria

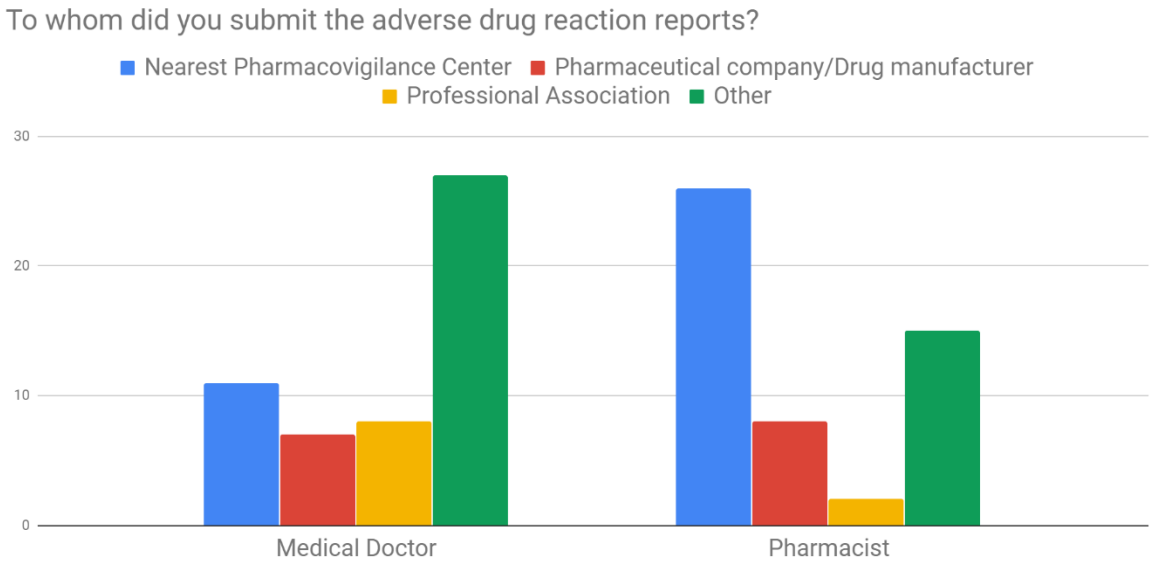

Figure 18b: Who did you submit ADR reports in Nigeria

Question 19:

Unfortunately, only 27.0% of respondents (eight medical doctors and 20 pharmacists) received an acknowledgement or feedback for an ADR report submitted while an overwhelming 73.0% of respondents (45 medical doctors and 31 pharmacists) did not according to this survey.

This depicts a poor acknowledgement and follow-up culture even among the regulatory authorities as it pertains to the handling of ADR reports in Nigeria.

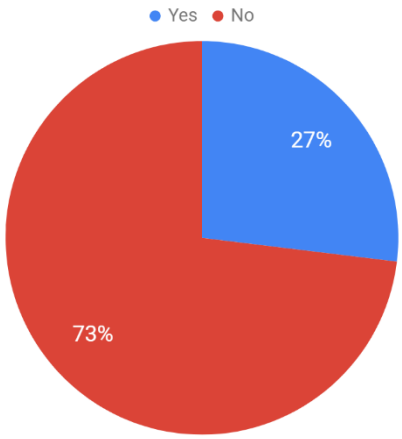

Figure 19a: ADR report acknowledgement or feedback

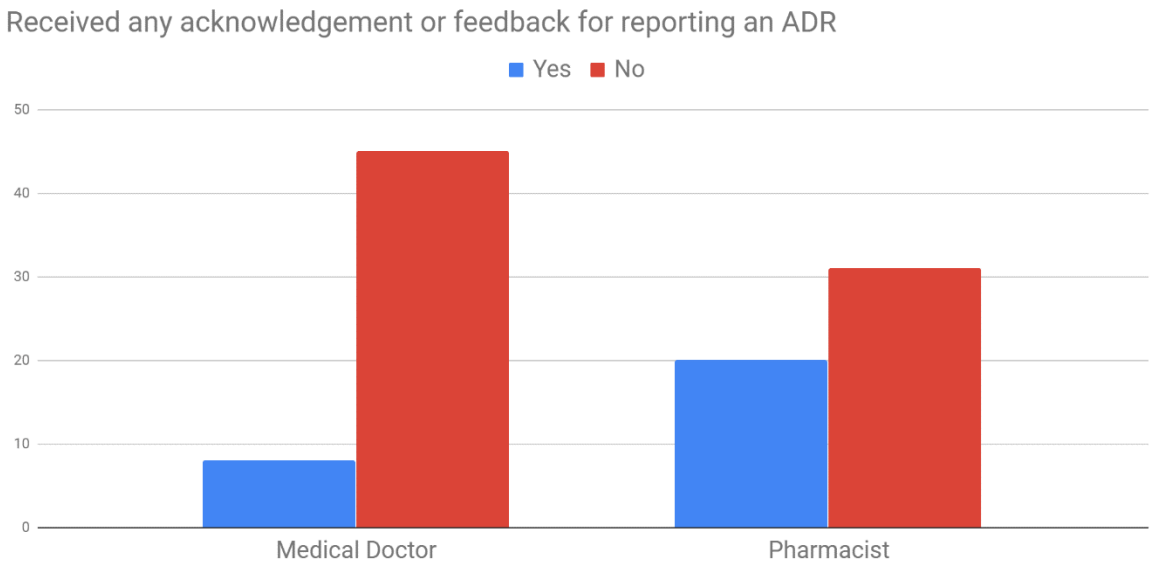

Figure 19b: ADR report acknowledgement or feedback

Question 20:

In examining the awareness and familiarity with the guidelines and regulations governing ADR reporting in Nigeria, an overwhelming majority, 76.0% of respondents (46 medical doctors and 33 pharmacists) stated they were not familiar with the

Nigerian guidelines and regulations pertaining to ADR reporting compared to only 24.0% of respondents (seven medical doctors and 18 pharmacists) who were familiar with them.

This confirms that most medical doctors and pharmacists were unfamiliar with the guidelines and regulations governing ADR reporting in Nigeria. Among those familiar with these guidelines and regulations, the pharmacists edged over the medical doctors with 39.0% of the pharmacist respondents being familiar with these regulations compared to just 15.0% of medical doctors that responded.

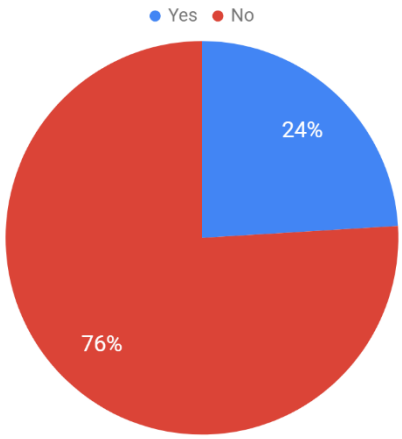

Figure 20: Nigerian guidelines and regulations for ADR reporting

Question 21:

In analysing the attitude of healthcare professionals towards updating and improving their knowledge on ADR reporting systems in Nigeria which is a follow up to the previous question, an impressively 84.0% of respondents (48 medical doctors and 39 pharmacists) were willing to update and improve on their knowledge about ADR reporting systems in Nigeria. Only 6.0% of respondents (six pharmacists) would not consider it. About 10.0% of respondents (five medical doctors and six pharmacists) remained indifferent and provided no answer.

As confirmed by the answers recorded, both healthcare professionals were open to updating their knowledge about ADR reporting systems, despite the poor awareness of guidelines or regulations and the low reporting rates in Nigeria.

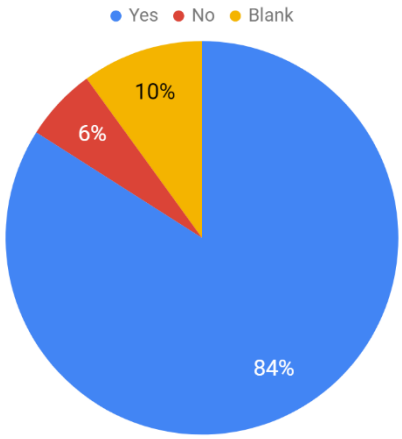

Figure 21: Updating knowledge on Nigerian ADR reporting systems

4.5 Adverse Drug Reaction (ADR) Reporting- Challenges (Question 22 i - ix)

Question 22:

In the analysis of challenges among healthcare professionals in reporting ADRs in Nigeria, several options were provided to the respondents to ascertain their opinions on the subject. The author hopes to gain insight into the position of Nigerian medical doctors and pharmacists on these factors that pose challenges which they agree or disagree accordingly.

44.0% of respondents agreed that a busy work schedule and insufficient time to submit an ADR report was a factor, 28.4% respondents were neutral, while 27.5% outrightly disagreed.

46.8% of respondents agreed that complex ADR reporting processes was a factor, 33.9% of respondents remained neutral, while 19.3% of respondents disagreed.

The largest percentage of respondents totalling 66.1% agreed that inaccessible report forms when needed was a factor, 20.2% respondents remained neutral, and 13.8% respondents disagreed.

34.9% of respondents agreed that fear of exposure to legal liabilities from patients or drug manufacturers, 23.9% of respondents remained neutral, while 41.3% of respondents disagreed.

Interestingly, 25.7% of respondents agreed that concerns an ADR report might be wrong was a challenging factor to ADR reporting, with 33.0% of respondents choosing to be neutral while 41.3% of respondents disagreed.

Regarding concerns that the process of filling and submitting an ADR report is extra unpaid work, 32.1% of respondents agreed it is a challenging factor, 18.3% of respondents remained neutral while 49.5% of respondents disagreed.

37.6% of respondents recorded that the assumption there was no need to report an already established ADR was a factor that posed as a challenge. 18.3% of respondents remained neutral, while 44.0% of respondents disagreed.

33.0% of respondents agreed that a healthcare professionals' level of clinical knowledge making it difficult to diagnose an ADR is a contributory factor to challenges they faced. 26.6% of respondents remained neutral while 40.4% of respondents outrightly disagreed.

28.4% of respondents attributed the challenges of ADR reporting among healthcare professionals to fear of disciplinary queries and negative impact of the ADR report towards other colleagues, 26.6% of respondents stayed neutral and 44.5% of respondents disagreed.

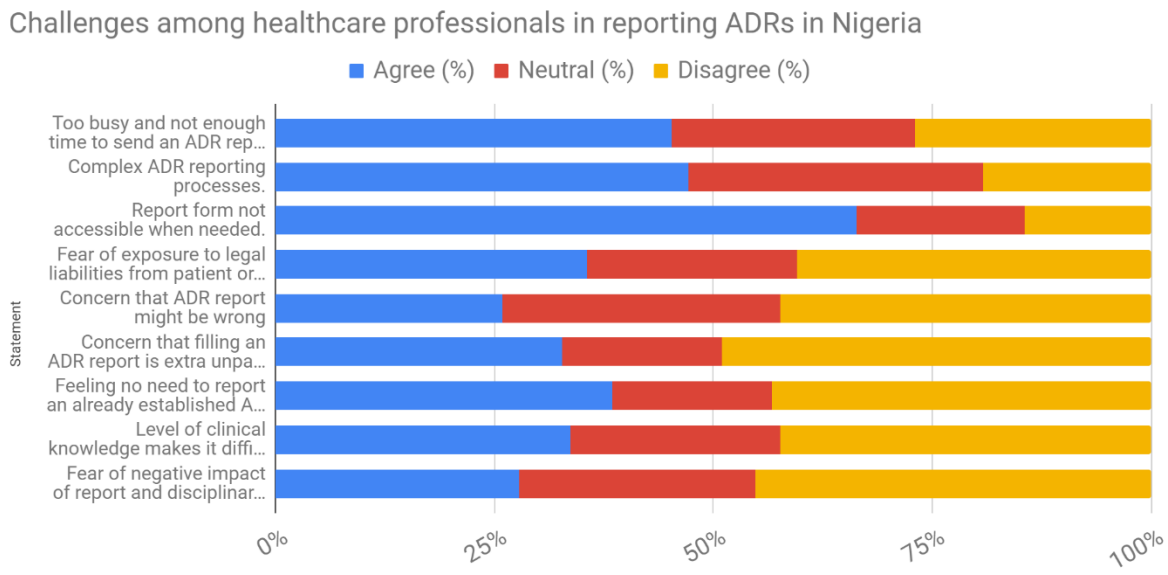

Figure 22: Challenges among healthcare professionals in reporting ADRs in Nigeria

4.6 Adverse Drug Reaction (ADR) Reporting- Recommendations (Questions 23 i – vi)

Question 23:

Drawing from the entire sections of the survey, this question aimed to provide considerations for the respondents to select from by agreeing or disagreeing. An overwhelming majority of respondents agreed with all the recommendations proposed in the survey as being effective towards the goal of improving ADR reporting in Nigeria.

98.2% of respondents agreed that pharmacovigilance conferences and continuous education programs to improve awareness would be effective with just 1.8% of respondents remaining neutral.

95.4% of respondents agreed that adverse drug reporting courses and modules should be included during professional training to improve knowledge with 4.6% of respondents remaining neutral.

94.5% of respondents agreed that the current regulations governing ADR reporting in Nigeria should be reviewed, making it a professional obligation among healthcare professionals while 5.5% of respondents remained neutral.

As it pertains to incorporating remunerations for every ADR case reported in order to encourage good pharmacovigilance practices among healthcare professionals, 74.3% of respondents agreed, 22.0% of respondents remained neutral while only 3.7% of respondents disagreed.

95.4% of respondents agreed that increasing publicity about ADR reporting schemes in local healthcare journals would be an effective recommendation while 4.6% of respondents remained neutral.

90.8% of respondents agreed that establishing an ADR department in their place of practice, headed by an ADR specialist to encourage drug safety practices in health institutions would effectively improve ADR reporting in Nigeria while 9.2% remained neutral.

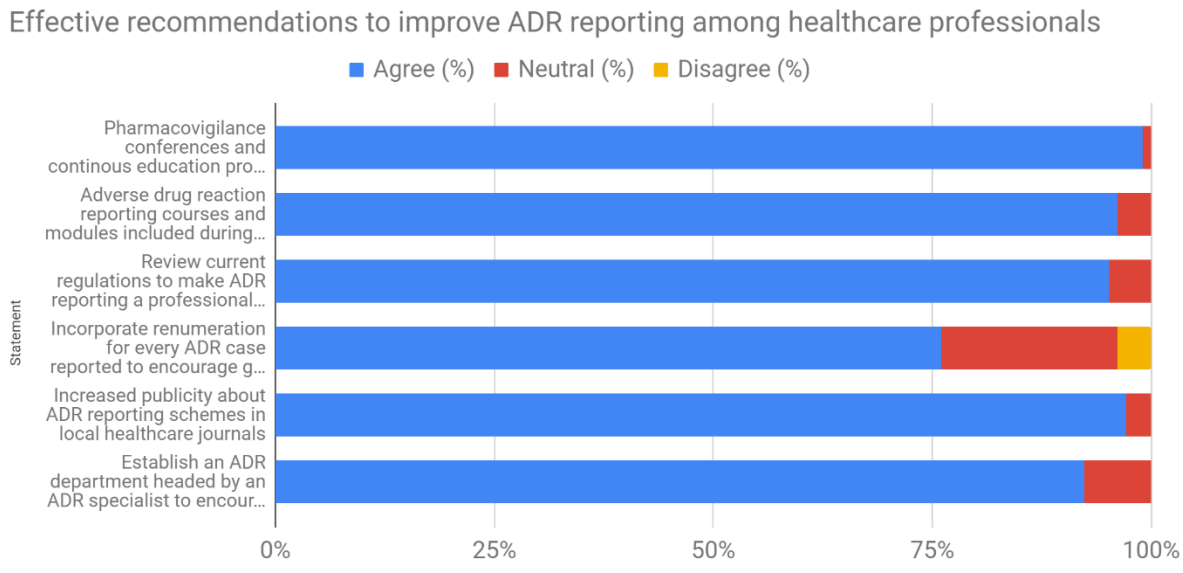

Figure 23: Improvement recommendations for ADRs reporting in Nigeria

4.7 Qualitative Analysis:

4.7.1 Phone interview with Highly experienced Medical Doctor (over 10 years)

The author explored his alumni association group for contacts of five specialists: four Internal medicine consultants and one forensic pathologist and had phone interviews with them to explore their perceptions on ADR reporting in Nigeria and the challenges faced by medical doctors resulting under reporting of ADRs. They gave consent for the interview on the condition of an anonymous status, however they were all over 50 years of age and had been in medical practice for over 10 years. Three of them worked in government hospitals in the west while two had their private hospitals in the east of Nigeria.

Three of the specialists admitted having observed an average of 20 ADRs in the past 12 months but can recall submitting only a handful of reports in the same time period. The other two specialists said they did not bother to submit ADR reports anymore as they believed it did not make any difference to the management of the patients. They all agreed that they had never received feedbacks or updates on previously reported ADRs and that it took a long time for the regulatory authorities to decisively act on ADR reports in Nigeria.

Sadly, none of them were aware of the ADR e-reporting form available on the NAFDAC website and only two were aware of the National pharmacovigilance centre operating in the geographical zone where they practised. Only two specialists admitted to having access to yellow cards or ADR forms in the government teaching hospitals where they consulted.

When the specialists were asked about a gap observed from the survey questionnaire, in which many respondents who were young medical doctors with one to five years of experience selected other option when asked where they submitted ADR reports, they suggested that most young doctors would report ADRs to the next ranking medical doctor who supervises their practice or to the medical

management instituted at their place of work. They explained that it is a factor of the medical training received as the medical profession is a profession of hierarchy and most young doctors are unaware of their responsibilities to directly report any observed ADR to the regulatory authorities as well.

All the specialists admitted that the entire ADR reporting system needed to be reviewed by the regulatory authorities as the process currently in place does not encourage ADR reporting. They recommended ADR reporting to be made compulsory and incentivised to encourage young doctors to report ADRs. They further implied that more educational interventions such as seminars for practicing doctors and tutorial classes for medical students should be utilised to improve the culture of reporting ADRs in Nigeria.

4.7.2 Phone Interview with Highly experienced Pharmacists (over 10 years)

The author utilised his alumni association group for the contacts of five experienced pharmacists- three teaching hospital pharmacists and two community-based pharmacists and successfully scheduled phone interviews in order to ascertain their respective opinions on ADR reporting in Nigeria and the factors which they consider as challenges to effective reporting of ADRs among Nigerian pharmacists. They also gave their consent verbally for the interview and the use of information obtained on the condition of anonymity. They were all over 50 years of age and had been in practice for over 10 years.

They all understood the importance of pharmacovigilance activities such as ADR reporting in Nigeria. They all admitted to regularly observing ADRs in their respective practices but had not reported any ADRs in the past 12 months because most of the ADRs they observed had all been well established over time and not unusual or life-threatening. However, they were all aware of the regulatory authorities responsible for handling ADR reports and correctly identified the location of the National

pharmacovigilance centre in their geographical location. It is important to note that the pharmacists working in hospitals were more likely to report ADRs than those working in community pharmacies as there was a more formal structure and process instituted in government-based teaching hospitals than in the community pharmacies.

In addition, they explained that easy accessibility of drugs in pharmacies contributes to the prevalence of ADRs observed in among healthcare professionals in Nigeria. Patients can purchase most medications without prescriptions in any pharmacy shop and most pharmacists working in these shops tend to assume the role of doctors by offering treatment to patients for lesser cost. And as a result, pharmacists are generally less inclined to submit reports of ADRs observed as it implicates them resulting in disciplinary measures and suspension of license by their professional associations.

Furthermore, they complained that regulatory authorities were ineffective in their responsibility of promoting the ADR reporting training programs that should encourage reporting among healthcare professionals. They also pointed out the peculiarity of the Nigerian healthcare system as being contributory to the difference in reporting rates when compared with their medical doctor colleagues as most patients at risk of ADRs or experiencing one would usually visit their medical doctors instead. The pharmacists are only approached for consult when the medication history is being reviewed by medical management team. They also pointed out that most pharmacists would rather report ADRs to the respective drug manufacturer or pharmaceutical company rather than to the regulatory authority. Due to good existing relationships between pharmacists and drug company representatives, they are more likely to receive feedback from the companies than from the regulatory authorities. Another reason they explained was due to the inaccessibility of yellow cards or ADR forms when needed.

They all recommended increased awareness and outreach programs to improve ADR reporting rates among healthcare professionals in Nigeria. They also approved that making ADR reporting a professional obligation of healthcare professionals would greatly improve the attitudes and culture towards ADR reporting.

4.8 Conclusion

As evidenced by the analysis and findings presented above, it has become apparent that most medical doctors and pharmacists have only an average knowledge and awareness of ADR reporting in Nigeria. They can correctly identify ADRs and the criteria to be considered for submitting a report, whether unusual, serious or new drug reactions. However, the practicality of effective reporting remains a challenge in Nigeria. Despite the poor attitudes and will-power to report ADRs routinely observed in their respective practices, they exhibited a willingness to improve and do better if proper continuous education and training is made available and the means of reporting becomes more accessible.

The NAFDAC through the National Pharmacovigilance Centres have structured the ideal reporting models for the country as noted on their website, however they have performed poorly in fulfilling their responsibility of raising awareness, providing training and encouraging better drug safety practices and pharmacovigilance among healthcare professionals. Very few healthcare professionals are aware of the guidelines and regulations governing the ADR reporting system in Nigeria. The availability of the ADR e-reporting forms on the NAFDAC website is an information that is unknown among most health care professionals. The regulatory authorities rarely acknowledge or follow up on reported ADRs which results in poor reporting rates among medical doctors and pharmacists who are expected to be the primary reporters of ADRs.

This is in consonance with the information from the qualitative analysis obtained from the phone interviews with both groups of highly experienced healthcare professionals being studied. They confirmed the discrepancy in high rates of ADRs observed in practice when compared to the current poor rate of ADR reporting in Nigeria. The few reports submitted, usually made for serious and life-threatening cases failed to generate prompt feedback or acknowledgements which inevitably results in little or no follow-up between the professionals and the regulatory bodies.

The highly experienced pharmacists during the phone interviews criticised the ease with which patients could access prescription drugs over the counter as being the main causative factor to ADRs in Nigeria. Despite better awareness of regulations and guidelines among pharmacists, they are more likely to report ADRs to the drug manufacturers rather than the regulatory authorities. They explained the close working relationships between drug company representatives and pharmacists as main reason facilitating the observation.

The factors posing challenges vary greatly among both groups of healthcare professionals as the challenges faced by medical doctors does not necessarily translate to the same challenge faced by pharmacists. However, according to survey results both groups tend to agree that ADR reporting should be made compulsory and a professional obligation in order to improve ADR reporting in Nigeria. Every recommendation provided received high rates of approval among both groups of healthcare professionals from the survey. The highly experienced professionals agreed with the recommendations proposed in the questionnaire. However, despite the overwhelming majority favouring the recommendations from both approaches, a few opposed the idea for extra remunerations for every ADR reports made as it tends to distract from the purpose of ADR reporting which is focused on pharmacovigilance to improve drug and patient safety in Nigeria.

In the next chapter, further conclusions are made by the author as it regards to the research questions posed earlier. Comparisons from the literature review and

primary research findings are presented, in addition to conclusions and reflections on the conducted study.

CHAPTER 5: CONCLUSIONS

5.1 Answering the three main research questions:

Question 1: Are healthcare professionals aware of Adverse drug reaction reporting in Nigeria, the reporting systems available, the applicable guidelines and regulations and their responsibility towards pharmacovigilance?

From the responses obtained in the survey and acknowledged by experienced medical doctors and pharmacists during the phone interview, it is apparent that there is an above average awareness among the healthcare professionals towards the issue of ADR reporting and its importance in Nigeria. This awareness is chiefly the result of the education and training obtained as undergraduates of universities. As a result, healthcare professionals through verbal communications among colleagues continue to be aware of ADR reporting and the systems available in Nigeria.

However, the responsibility of promoting an awareness of ADR reporting and pharmacovigilance by the Nigerian Agency for Food and Drug Administration and Control through its National Pharmacovigilance centres still presents a gap that needs to be filled. Despite evident attempts by the NAFDAC in providing a structured ADR reporting system as noted on their website, they have failed in translating these efforts to improved awareness of the established guidelines and regulations among the groups of healthcare professionals studied. Those who participated in this study encouraged regular pharmacovigilance awareness programs and better feedback measures targeted to healthcare professionals in order to bridge the gap created by the lack of awareness of basic reporting methods available.

Question 2: What factors pose as challenges to ADR reporting in Nigeria, predisposing to ADR under-reporting and poor implementation of ADR reporting and other drug safety practices in Nigeria?

As evidenced by the survey and phone interview carried out, both groups of healthcare professionals attribute ADR under reporting in Nigeria to the same factors plaguing other countries globally. These includes lack of adequate healthcare resources, poor training of staff, time and work constraints due to long work hours and limited staff numbers in healthcare institutions.

Other factors border on the inaccessibility of ADR forms when needed, failure of regulatory authorities to provide feedback on time and the complex nature of the ADR reporting processes generally contribute to low reporting rates among healthcare professionals.

The analysis of challenges impacting by ADR reporting in practice as observed by healthcare professionals ensure that the burden it bears on the healthcare system cannot be overlooked.

Question 3: What suggestions and recommendations would help to improve adverse drug reaction reporting among healthcare professionals in clinical practice?

Since there is only an average knowledge of ADR reporting among both healthcare professionals with the pharmacists seemingly more knowledgeable than medical doctors, the guidelines and regulations regarding ADR reporting should be adequately implemented to improve reporting rates in Nigeria. As noted from the quantitative and qualitative analysis, both groups of healthcare professionals mutually agree that the regulatory authorities should be more proactive by organising pharmacovigilance conferences and continuous education programs to improve awareness. Increased publicity on ADR reporting schemes should be promoted as well as improving accessibility of reporting methods to the healthcare professionals.

It is encouraging that both groups agree that current regulations pertaining to ADR reporting should be reviewed to make it a professional obligation among healthcare

professionals. Healthcare institutions should be encouraged to establish an ADR department, overseen by an ADR specialist in order to foster drug safety practices in these institutions. While incorporating renumerations for every ADR report submitted was met with most of the support, a critical few objected to the proposition believing it would distract from the purpose of ultimately ensuring patient safety to a money-making avenue considering the huge amounts of ADRs regularly observed in Nigeria. While this might be true, the author believes that incentivising ADR reporting would significantly improve reporting rates. Incentives should rather be in form of recognition and awards rather than financial reimbursements in order to foster pharmacovigilance and drug safety practices among other stakeholders in the healthcare sector.

5.2 Comparing and contrasting results from primary and secondary research.

The above average knowledge of ADR reporting and its finding among healthcare professionals in Nigeria is an encouraging finding when compared to similar studies from the literature review. The willingness to update knowledge on the issue remains remarkable as a positive attitude towards the subject. However, the lack of awareness of ADR reporting guidelines and regulations as well as the poor awareness and utilisation of the ADR e-reporting form presents significant challenges to effectively improve ADR reporting in Nigeria. This observation translates to significantly higher under-reporting rates when compared to western countries studied. Under-reporting of ADRs remain a global challenge but the reasons remain vastly varied across regions. The general factors ranging from indifference to ADR reporting, poor knowledge and accessibility of reporting methods, poor awareness of guidelines surrounding the reporting procedures are to great extent the same as observed from other studies in Nigeria and other countries. The attendant consequences of this pitfall results in high morbidity and mortality rates in Nigeria as noted in previous studies. (Fadare *et al.*, 2011)

While few studies on ADR reporting in Nigeria compare multiple groups of healthcare professionals, this study demonstrates that pharmacists are more predisposed to favourable outcomes regarding ADR reporting than their medical doctor counterparts. They have better knowledge of drug reactions and criteria necessitating a report, are more aware of the National pharmacovigilance centres around their place of practice and have better work time and less busy schedules to enable them submit ADR reports more often. The challenges predisposing medical doctors were widely different from the pharmacist with the exception that both groups of healthcare professionals agree that the inaccessibility of reporting methods when needed presents the most challenge to good reporting practices. (Oshikoya and Awobusuyi, 2009)

Improving ADR reporting in Nigeria would greatly reduce the healthcare costs and mortality rates and further reduce the incidence of ADRs observed. A common theme through previous studies continues to encourage more awareness measures and further education as recommendations. The role of the regulatory agencies remains critical in sensitising the healthcare professionals and public towards good pharmacovigilance and drug safety practices. The efforts of NAFDAC in improving the knowledge resources and provision of e-reporting alternatives on their website is commendable. As suggested by both groups of healthcare professionals, a review of regulations to make ADR reporting compulsory as a professional obligation towards patient safety bears great potential. While financial incentives as noted from other studies remains unethical, incentives in the form of professional recognitions could encourage the implementation of effective ADR reporting practices in Nigeria. (Opadeyi, Fourrier-Réglat and Isah, 2019)

5.3 Concluding thoughts

5.3.1 Contributions and limitations of the Research

The research was completed adequately, having generated data from survey questionnaires and phone interviews from One hundred and fourteen (114) respondents despite the relatively limited time available for the study. The data was analysed and provided in form of tables and charts for better interpretation and perception. While most research papers about ADR reporting focused on just a single group of healthcare professional, this research compared both medical doctors and pharmacists in one study. The survey questionnaire received responses from both groups of healthcare professionals practicing broadly across the 4 geographical zones in Nigeria.

The main limitation is the relatively small number of highly experienced medical doctors and pharmacists interviewed over the phone. In addition, several other factors such as personal bias of the respondents and level of accuracy to recall details could impact the interpretation of results obtained. The potentially diverse opinions of other non-responders and of participants who failed to answer every question in the survey could have also affected the outcomes.

While insights into NAFDACs regulatory role towards pharmacovigilance provided knowledge of ADR e-reporting forms and awareness of the ADR reporting systems from its website, the scope of the activities of its National pharmacovigilance centres regarding the handling and investigation of submitted ADR reports are yet to be established. The author believes that challenges impacting ADR reporting among healthcare professionals would differ across each of the 4 geographical zones in Nigeria as the level of education, awareness and economic developments vastly differ across these regions.

The author assessed that the contributory factor with the most agreeing responses from both groups of healthcare professionals was the inaccessibility of ADR forms and yellow cards when needed. This was closely followed by the complex nature of the ADR reporting processes and the excessively demanding work schedules and time pressure on these healthcare professionals. Despite the above average

knowledge and positive attitudes towards improving ADR reporting practices noted from the study, other factors elicited were met with more disagreeing responses than was expected, limiting the perception of challenges faced and leaving room for further research.

5.3.2 Recommendations for practice

From this research findings, knowledge and understanding of ADR reporting among healthcare professionals traditionally stems from undergraduate professional trainings, textbooks or journals and less from the applicable regulatory authority. Despite the availability of significant knowledge resources on their website, most healthcare professionals were either unaware of its existence or utilised the resources available such as the ADR e-reporting forms. This lack of awareness should be addressed by organising regular awareness programs aimed at generating interest in the issue of ADR reporting.

The course content of the medical and pharmacy students should be reviewed to include modules and tutorials on pharmacovigilance and drug safety practices prior to graduation. They should specifically address reporting systems and methods available, organisations responsible for handling ADR reports, importance of ADR reporting, ADR classifications and criteria for submitting ADR reports.

Additionally, healthcare institutions and pharmacies should establish an ADR department headed by ADR specialists to improve attitudes to reporting and implement record keeping systems for ADRs observed within its walls. These ADR specialists should be responsible for liaising with the National Pharmacovigilance centre close to the healthcare institution to ensure adequate feedback is obtained on individual reports submitted.

5.3.3 Recommendations for future research

Further research needs to be expanded to include nurses to improve spontaneous reporting of ADRs as they represent a critical group of healthcare professionals who are regularly in contact with patients and are usually the first-in-line to observe and report ADRs in hospitalised patients. Additionally, non-healthcare professionals (patients) should also be studied and compared to healthcare professionals as they can significantly increase the ADR database in Nigeria. This is particularly important as most ADRs occur outside healthcare institutions without the observation of trained healthcare professionals due to the use of traditional herbal medicines and indiscriminate purchase and use of prescription drugs without adequate regulatory oversight.

There is still a potential scope to carry out research for ADR reporting focusing on each of the 36 states of the country and comparing results from these states with each other, to determine the unique challenges faced within each geographical zone in Nigeria. States having better ADR reporting practices and higher rates of submitted ADR reports can offer suggestions that are better suited to implementing ADR reporting and other good drug safety practices among healthcare professionals.

Further study should be carried out with the regulatory authorities in the form of interviews and questionnaires to determine the challenges facing them in fully implementing the pharmacovigilance models among healthcare professionals and the patients in Nigeria. Other professional councils involved in healthcare such as the Pharmaceutical Council of Nigeria (PCN) and Medical and Dental Council of Nigeria (MDCN) should be studied as well as partners in the quest to advance pharmacovigilance and ADR reporting in Nigeria.

The role of the internet and social media needs to be further researched as a tool to increase knowledge and awareness of ADR reporting in Nigeria. This research shows that despite the increased waves of social media advances and participation, very few healthcare professionals currently receive ADR information and knowledge from this source despite the active social media pages of the regulatory authorities.

These recommendations would provide additional insights about ADR reporting in Nigeria.

5.4 Final Conclusions

In concluding this research and analysis on the knowledge, awareness and challenges of ADR reporting among healthcare professionals in Nigeria and after reviewing appropriate literature on the subject across the world, the author found the process very informative and helpful in filling the gaps regarding the perspectives of both medical doctors and pharmacists towards ADR reporting.

As deduced from the literature review, global under-reporting rates were significantly due to lack of knowledge and resources needed to identify, observe, monitor or report potential ADRs. However, while a lack of dedicated resources was also typical in Nigeria, the author concludes that the Nigerian healthcare professionals maintained an above average knowledge of ADRs and the criteria necessary for reporting them, unlike results from other countries studied. This was partly due to the persisting focus on knowledge acquisition rather than its practicality and implementation. The resulting effect is that ADR reporting rates continue to remain significantly lower than expected. According to the pharmacists, the low reporting rates persists despite the relatively high rates of observed ADRs in health institutions mainly due to the prominence of self-medication and ever-increasing healthcare costs. The ease of purchase of prescription drugs over the counter without proper prescription notes facilitates this ADR prevalence and the lack of stringent regulatory oversight on the issue coupled with the belief that submitting ADR reports makes no difference in patient management results in failure and poor implementation of adequate ADRs reporting practices. Furthermore, the medical doctors cited the main factor limiting the practice of ADR reporting to the inaccessibility of yellow cards/ADR forms as at when needed. Inadequate work-time, very busy schedules, complex ADR reporting processes and inadequate awareness of

the available reporting methods further limits the practice of ADR reporting in Nigeria.

Most healthcare professionals opted for the regulatory authorities to review ADR reporting regulations to ensure it becomes a compulsory practice, seen as a professional obligation. This depicts the overwhelming willingness of most medical doctors and pharmacists to improve pharmacovigilance and drug safety practices in Nigeria. The author notes that while the NAFDAC have improved its website and provided an ADR e-reporting form online, they have performed poorly in educating the healthcare professionals on ADR reporting and creating adequate awareness to ensure these resources are utilised effectively. Adequate resources should be set aside to organise seminars on pharmacovigilance and continuous education programs on ADR reporting regularly, specifically targeted to healthcare professionals in Nigeria.

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Adverse Drug Reaction (ADR) Reporting in Nigeria: Healthcare Professionals Survey

Dear Respondent,

I am Dr. Prosper Chibuikem Anaedu, a post-graduate student at Griffith College Dublin, Ireland. I am carrying out a dissertation research on the challenges impacting the reporting of adverse drug reactions among healthcare professionals in Nigeria as part of requirements for the degree of Masters (MSc) in Pharmaceutical Business and Technology.

Adverse drug reaction is an unwanted and/or harmful reaction experienced by a patient following drug therapy. The World Health Organization (WHO) defines it as a response to a medicine which is harmful and unintended and which occurs at doses normally used in man for the prevention, diagnosis or treatment of diseases, or for the modification of physiological function.

Adverse Drug reaction reporting is critical in improving pharmacovigilance in Nigeria. This oversees the science and activities that relates to the knowledge, detection, assessment and prevention of adverse events or any drug-related issue.

The survey is made up of 5 sections aimed at collecting information on the participants demographics, knowledge, awareness, challenges and recommendations for improvement of ADR reporting in Nigeria. Please kindly answer the questions by selecting your preferred option.

The privacy of every participant is highly assured as no response will be linked to any participant and will be strictly confidential. All data generated will be handled in line with the General Data Protection Regulation (GDPR).

Thank you for your participation.

* Required

1. Participant Agreement *

- [ ] I agree to voluntarily participate in this research study and give consent to have my responses used for this purpose.

Next

Adverse Drug Reaction (ADR) Reporting in Nigeria: Healthcare Professionals Survey

* Required

Demographics

2. What is your gender? *

- Male
- Female
- Prefer not to say

3. What is your age group? *

- 18 to 30
- 31 to 40
- 41 to 50
- 51 or older

4. Which healthcare professional is completing the survey? *

- Medical Doctor
- Pharmacist
- Other

5. In which geographical zone in Nigeria do you practice? *

- North
- South
- East
- West

6. How long have you been practicing in your field? *

- less than a year
- 1 year to 5 years
- 6 years to 10 years
- Over 10 years

Back Next

Adverse Drug Reaction (ADR) Reporting in Nigeria: Healthcare Professionals Survey

* Required

Adverse Drug Reaction (ADR) Reporting (Knowledge)

7. Do you know how to report ADRs in Nigeria? *

- [ ] Yes
- [ ] No

8. If yes, what is your source of knowledge for ADR reporting?

- [ ] Professional textbooks and journals
- [ ] Verbal communication from colleagues
- [ ] Newsletters from regulatory agencies
- [ ] Internet and Social Media

9. Which organisation is responsible for pharmacovigilance and handling ADR reports in Nigeria? *

- [ ] Pharmacists Council of Nigeria (PCN)
- [ ] Medical and Dental Council of Nigeria (MDCN)
- [ ] Nigerian Agency for Food and Drug Administration and Control (NAFDAC)
- [ ] World Health Organisation (WHO)

10. Which of the following methods of reporting ADRs in Nigeria is familiar to you? *

- [ ] Yellow card/ADR forms
- [ ] ADR e-reporting form
- [ ] Both
- [ ] None

11. In your opinion, which is the most important criteria for submitting an ADR Report? *

- [ ] Unusual reactions
- [ ] New drug product reactions
- [ ] Serious/Life-threatening reactions
- [ ] All of the above

Back Next

Adverse Drug Reaction (ADR) Reporting in Nigeria: Healthcare Professionals Survey

* Required

Adverse Drug Reaction (ADR) Reporting (Awareness)

12. In your opinion, who is mainly responsible for reporting ADRs? *

- Medical Doctors
- Pharmacists
- Other healthcare professional
- Any of the above

13. In your opinion, should ADR reporting be either compulsory or voluntary? *

- Compulsory
- Voluntary

14. Have you observed an adverse drug reaction within your practice in the past 12 months? *

- Yes
- No
- Maybe

15. If yes, how many ADRs on average have you observed within the same time period?

- less than 25
- 26 to 50
- 51 to 100
- Over 100

16. Have you reported an ADR in the past 12 months? *

- Yes
- No
- Not sure

17. If yes, how many ADR's have you reported on average in the same time period?

- Less than 5
- 6 to 10
- 11 to 20
- More than 20

18. To whom did you submit the adverse drug reaction reports? *

- Nearest Pharmacovigilance Center
- Professional Association
- Pharmaceutical company/Drug manufacturer
- Other

19. Did you receive any acknowledgement or feedback for reporting an ADR? *

- Yes
- No

20. Are you familiar with the Nigerian guidelines and regulations pertaining to ADR Reporting? *

- Yes
- No

21. If No, would you consider updating your knowledge about Nigerian ADR reporting systems?

- Yes
- No

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Adverse Drug Reaction (ADR) Reporting in Nigeria: Healthcare Professionals Survey

* Required

Adverse Drug Reaction (ADR) Reporting (Challenges)

22. As a healthcare professional, which of these do you consider as a challenge in reporting ADRs? *

Too busy and not enough time to send an ADR report.

Complex ADR reporting processes.

- ○ Agree
- ○ Neutral
- ○ Disagree

Report form not accessible when needed.

Fear of exposure to legal liabilities from patient or drug manufacturers.

Concern that ADR report might be wrong

Concern that filling an ADR report is extra unpaid work

Feeling no need to report an already established ADR

Level of clinical knowledge makes it difficult to diagnose an ADR

Fear of negative impact of report and disciplinary queries towards colleagues

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Adverse Drug Reaction (ADR) Reporting in Nigeria: Healthcare Professionals Survey

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Adverse Drug Reaction (ADR) Reporting (Improvement)

23. Which recommendation do you consider as effective to improve ADR reporting in Nigeria? *

Pharmacovigilance conferences and continous education programs to improve awareness.

- ◌ Agree
- ○ Neutral
- ○ Disagree

Adverse drug reaction reporting courses and modules included during professional training to improve knowledge.

Review current regulations to make ADR reporting a professional obligation among healthcare professionals.

Incorporate renumeration for every ADR case reported to encourage good pharmacovigilance practices among healthcare professionals.

Increased publicity about ADR reporting schemes in local healthcare journals

Establish an ADR department headed by an ADR specialist to encourage drug safety practices in health institutions.

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