Drug Information Services Utilization In Nigeria From 1980-2020: A Narrative Review Of Related Studies

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Abstract

The functioning and utilization of Drug Information Services (DIS) are reviewed in other climes with several studies on the subject matter and measures are taken for quality control of the information output from the Drug Information Centers (DICs). Although some studies assessed the drug information (DI) needs of healthcare professionals and their attitude towards DIS, there still exists the need to provide an overview of the state and extent of DIS and related studies in Nigeria as a means of creating awareness and promoting possible interventional measures. This study presented an overview of Drug Information Services and utilization in Nigeria and generated information for intervention and policy making. This study reviewed the state of drug information services and their utilization in Nigeria using narrative review of relevant literature. The literature search was conducted on computerized databases. Search terms were used singly, in combination, and truncation to select and synthesize articles. The studies selected included those written in the English Language, carried out in Nigeria, with clear study design and properly stated year of publication which fell within the stated years of 1980 to 2020. The data obtained were subjected to descriptive statistics of frequency and percentage. The data was also subjected to comparative assessment using the Oxford and Scottish Benchmarks for Study Standard. Selection of articles gave rise to 41 articles that met the criteria. They were used for the study. The highest number of articles were cited in the Southwest (26.83%). This was followed by the southeast (24.39%). While the north-central had the highest number (12.20%)of articles cited in the north, the least number of articles was found in the north-east (2.44%). There were no articles on DIS and its utilization cited before the year 2000(0%) while the highest number of studies (90.24%) were carried out between 2011 and 2020. The studies fell within the lower half of the Oxford and Scottish benchmarks for the hierarchy of studies and study standards. Drug information Services and utilization in Nigeria are still at their primary stage. Most of the studies carried out were in the south-west and south-east. The leading study design carried out were cross-sectional descriptive surveys which fell within the lower half of two standard benchmarks (Oxford and Scottish) for the hierarchy of studies.

Keywords: Drug information service; Documentation; Utilization; Quality control

Introduction

Drug information can be defined as up-to-date, carefully scrutinized and pertinent data on drugs, and their uses about a given health case or any outstanding situation while Drug information service is the professional assemblage, management and provision of concise, accurate, and unbiased data on drugs and their uses in particular situations to healthcare professionals, patients and the public. The

irrational use of drugs has led to grievous consequences in patient-care. Therefore, the provision of reliable drug information at the point of need is quintessential for the rational use of drug, and more efficient outcomes in health care management. The sources of drug information can be classified into three, namely: Primary sources: This includes unpublished studies, researches, Journals and expert opinions. Secondary sources: These are indexing, and abstracting systems. It is mainly concerned with the organization of primary sources of information on drugs. Tertiary sources: This includes the reference books, compendia, Essential drug lists, Pharmacopoeias and drugs bulletin. There is also the commercial source of drug information which is mainly based on the promotional information on drug majorly provided by manufacturers and companies. There are the digital or electronic drugs information source which is getting more diversified with the advancement in technology.[1]

Since the time of the Apothecaries, the need for medicine and information on the use of medicines has remained an important aspect of healthcare management that cannot be overlooked. With the advancement in medicine, and the discovery of new chemical entities, the need for accompanying information has increased. This has brought greater responsibility for more concise, accurate and unbiased information provision. The need to meet up with this responsibility calls for requisite knowledge and skill in the area of drug information provision. Sequel to this persistent need, the first drug information center was established in 1962 by the University of Kentucky in the United States.[2] The goal of the center was to "support, assist and promote the rational drug therapy program" at the University of Kentucky. Subsequently, a drug information center was established in the UK in 1969 and gradually in other countries of the world. Recently, drug information services have also been embraced by some West African countries, including Nigeria.

In Nigeria, the first DIC began as a Medicine Information Centre (MIC), established by the Pharmaceutical Society of Nigeria (PSN) in Lagos.[3] In 1990, the National Drug Policy was introduced in Nigeria. This had been preceded in 1986 by the National Drug Formulary and Essential Drug List which was released in that year.[4,5] But poorly managed drug service prevented its implementation thereby rendering the intended boosting of the National Drug Policy, the pharmaceutical sector and DIS a mirage. Nevertheless, the setting up of Drug and Therapeutics Committees, DICs and the Drug Revolving Fund, (DRF) in most secondary and tertiary care facilities has been a positive achievement in the country toward improved drug service administration.[6] On the other hand, the Standard Treatment Guidelines STG was expected to be of assistance to drastically improve the quality of care in healthcare facilities. However, there is about only 30% usage of it. So, access to STG and its utilization is reportedly low in health care facilities against expectations of standard care delivery.[7] There is still a need for the government to consolidate on positive grounds gained against drug service mismanagement in the country to avert a total failure of the drug system.[6]

Although drug information centers have been set up in different tertiary institutions across the country which is supposed to operate in replicating the model of the MIC. Presently, there are very few drug information centers, and general drug information is majorly obtained from drug manufacturers, medical journals and medical representatives, and as well as marketer and reference books. Internet is useful for obtaining DI in Nigeria too, but its use is limited by poor power supply, and poor network penetrations to many areas of the nation, which make information retrieval, and processing cumbersome and

time-consuming for busy health providers in Nigeria. And in fact, computerized DI is completely lacking in some tertiary care institutions. A study that assessed the disposition of healthcare professionals towards DIS in the Eastern part of the country, showed that 79.1% of respondents mainly use medical journals, while 71.6% make use of medical representatives. Reference books were utilized at the rate of 67.2% for Emdex and 55.2% for BNF. The findings of the study revealed that although the attitudes of the healthcare professionals towards DIS were positive, the DICs are not fully equipped and functioning to standard in order to meet the information needs of the people.[17] Additionally, these DICs are expected to function in line with the global standard operations for Drug information services. And one of the standard practices for maintaining the effectiveness of DIC is quality control through quality assurance. In many countries of the world, studies are showing the work done on assessment/evaluation of the utilization of the DICs.[8,9] Although, there are a few studies on the awareness of the healthcare professionals and the people toward the provision of DIS in Nigeria, there is a paucity of studies on the quality control, evaluation, or assessment of the functionality, extent, or utilization of the DIS in Nigeria. This study presented an overview of Drug Information Services and utilization in Nigeria and generated information for intervention and policy making.

Methods

Study Area: The scope of the study included studies on Drug Information Centres carried out in Nigeria.

Review question: What is the state of drug information service in Nigeria?

Study population and type of studies included: All studies on Drug Information Centre published in MEDLINE, EMBASE, and Google Scholar. Only those studies which met the criteria for the review were selected.

Study Criteria: We utilized studies carried out in Nigeria in the English Language with a clear study design and no conflict of interest or methodological flaws. Only studies with a defined period or duration were considered.

Study design: The work was based on a review of the studies that have been carried out on drug information centers in Nigeria.
Risk of Bias: The risk of bias was tackled by selecting studies without subjects, sampling selection, and reporting bias.
Condition and Domain studied: Drug information and studies on drug information services in Nigeria.
Information source: Search for articles was conducted on MEDLINE, EMBASE, PubMed, and Google Scholar, and standard protocol for narrative review was used for data extraction.[10]
Data items and summary measures
The collection of data was based on the title of study, location, year of publication, sample size, inclusion and exclusion criteria, the hierarchy of studies, and level of evidence.
Context: All studies on drug information services in Nigeria within the stated period
Article Search process: The figure below (Fig. 1) represents a graphical illustration of how the search was conducted. The keywords related to the title of the study was used for the search. Other words relevant to the central theme and the concept were also employed individually, and in strings/series for the search. MEDLINE, EMBASE, PubMed, and Google Scholar were searched for articles on drug information services in Nigeria between 1980 to 2020, based on the study title. A total of 249 articles were found, 62 of the articles were from the EMBASE, 78 came from MEDLINE, and 109 from secondary search on Google Scholar. The articles obtained were assessed based on the eligibility criteria.

Study period: The study lasted from July to August 2021 covering the peer-reviewed articles from January 1980 to December 2020.

Ethical approval: It does not apply to this study.

Data Analysis: The data obtained were analyzed using descriptive statistics.

Study article selection process: The number of articles gotten from all the searches was 249 articles. Out of this, 62 were from EMBASE, 78 were from MEDLINE while 109 articles were obtained from secondary search with Google Scholar. Based on the eligibility criteria, 190 studies were screened out. On further screening based on invalid study design, 10 articles were eliminated remaining 49 studies. Out of this, 8 articles had incomplete follow-up data. This left 41 articles that met the requirement. Overall, 41 articles were used for the review.

Data extraction instrument, pilot testing, and data extraction process:

Data Extraction design was adapted from a similar study carried out in Nigeria by Ogbonna *et al* (2019).[11] Data was extracted by careful consideration of the articles, elimination of irrelevant or incomplete ones that did not meet the study objective and criteria. The remaining data were analyzed and pilot tested. Five articles were used for the pilot test and they were not included in the study. Further modifications such as the arrangement of the date items logically and designing of the sheet into an appropriate table format were made to obtain the final instrument. The instrument was approved by an independent assessor after critiquing it by applying it to two independent studies before being used for the data collection.

Flow Chart

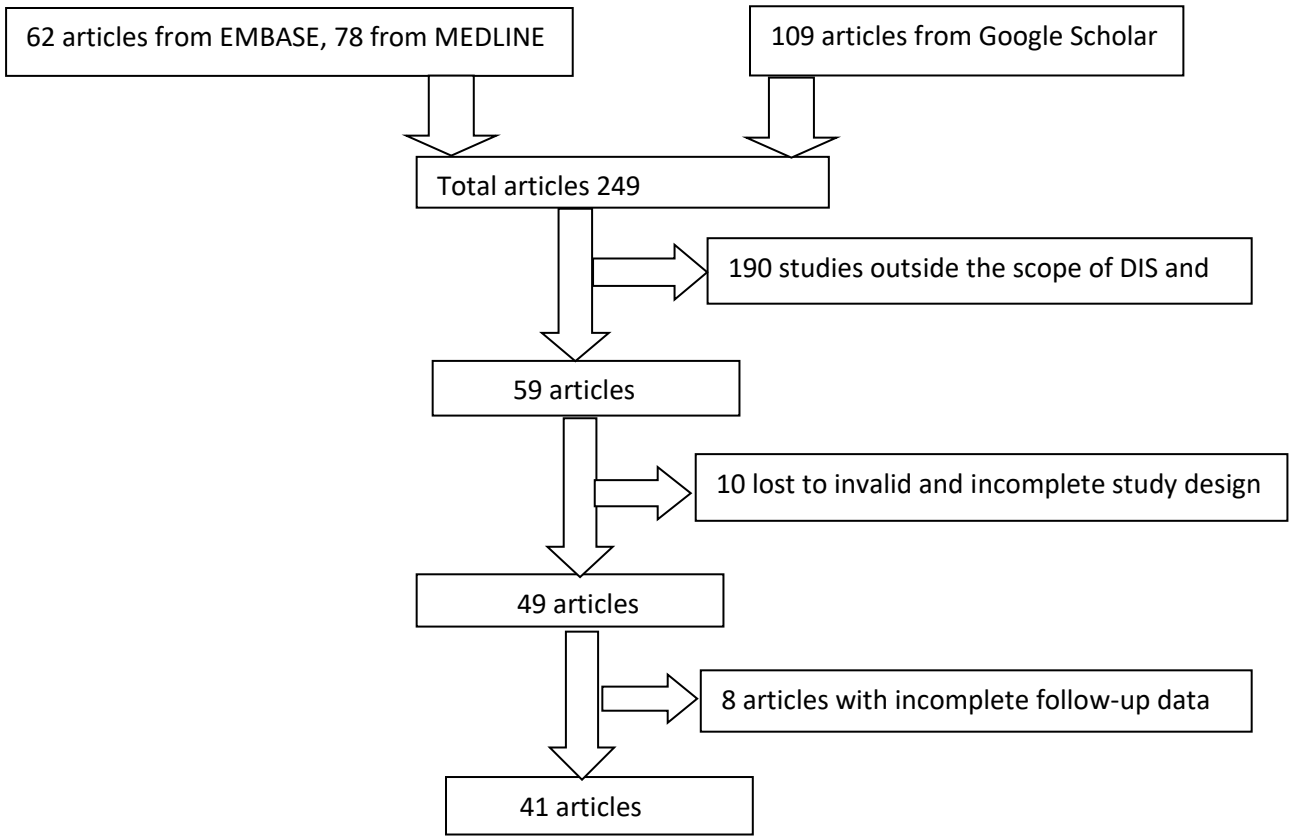


Fig 1: Flow Chart of the study article selection process

Result

The evidence-based table (Table 1) contains 41 articles. Articles 12 - 52 portrays the 41 articles which were finally selected for the study. The table also shows a summary of some important aspects of the studies which stood them out as to be selected for the study such as the design, year of study, sample size and eligibility criteria. It also portrays at a glance the location for the studies.

Table 1: Evidence-based table of selected articles (Table of Evidence):

Reference NO	Title	Location	Design	Year of Publication	Sample size	Inclusion	Exclusion	Study Instrument
12	Pharmaceutical Care Activities in Nigeria from 1970 to 2018: A Narrative Review.	National	Narrative Review	2019	38 articles	Peer-reviewed papers, Pharmaceutical care studies	Studies with methodological flaws. Studies with no	Published research articles

						conducted in Nigeria with defined protocol and study design	defined period, duration, sample size and location. Studies with methodological flaws	
13	Sources of drug information and their influence on the prescribing behaviour of doctors in a teaching hospital in Ibadan Nigeria.	South-west Ibadan	Prospective cross-sectional survey	2011	163 Doctors	Doctors working in UCH	Non-Physicians in UCH (University College Hospital)	Questionnaire
14	Access to drug information sources among health care professionals in Lagos state Nigeria: An exploratory study	South-west Lagos	Exploratory descriptive survey	2018	181 healthcare professionals	Registered Healthcare professionals working in Lagos state	Non-registered Health care professionals in Lagos	Questionnaire
15	Drug regulation and control in Nigeria: The challenge of counterfeit drugs	National	Prospective cross-sectional survey	2001	7 National Pharmaceutical organizations	Pharmaceutical Regulatory and Non-regulatory organization	Non-Pharmaceutical organizations	Questionnaire

16	Barriers to implementation of Pharmaceutical care by pharmacists in Nsukka and Enugu Metropolis of Enugu State	South-east Enugu	Prospective cross-sectional survey	2012	80 Pharmacists	Pharmacists in selected hospital and community pharmacies in Nsukka and Enugu Metropolis	Pharmacists working outside the selected hospital and community pharmacies	Questionnaire
17	Drug use and sources of drug information among secondary school students in Imo State, Nigeria	South-east Imo State	Prospective survey	2017	1400 students	Secondary school Students between ages of 16-17 years	Students below 16 years and above 17 years	Questionnaire
18	Assessment of attitude and behaviour of healthcare professionals towards provision of drug information services in Enugu State	South-east Enugu State	Prospective cross-sectional survey	2010	37 Doctors, 41 Pharmacists	Mostly Hospital Doctors and Academic Pharmacists	Intern Pharmacists and House Officers	Questionnaire
19	Evaluation of information contained in drug advertisement and promotion materials in Nigeria	National	Experimental	2015	248 drug leaflets insert, 54 Drug brochures	Drug promotional materials and packet inserts of drugs	Drug information materials that are not packet inserts or promotional	Drug package leaflets and drug promotional brochures
20	The study on the relevance of establishing drug information center in a secondary	South-West Abeokuta	Prospective Survey	2012	107 healthcare professionals	Registered healthcare professionals working in the	Non-healthcare professional in the	Questionnaire

	hospital in south-west Nigeria					institution of study	institution	
21	Evaluation of drug use pattern in Lulu Brigg's heath centre, Port Harcourt Nigeria, using WHO, prescribing indicators	South-south Port Harcourt	Cross-sectional study	2017	12,615 patient case files	Records of patients registered with TISHIP and NHIS insurance schemes	Records not registered with NHIS and TISHIP	Patient records
22	Assessment of Hospital Pharmacy Services in North-Western Nigeria	North - West	Prospective cross-sectional	2018	99 hospital Pharmacists	Hospital Pharmacists	Non-hospital pharmacists	Self-administered Questionnaire
23	Assessment of Pharmacists' Knowledge, attitude and Practices Regarding Herbal Drug Information Services	South-south Niger-Delta Region (the 6 states)	Prospective cross-sectional	2012	300 Pharmacists	Registered Pharmacists within the Niger-Delta region, aged 21 and above	Pharmacists outside the Niger-Delta region	Questionnaire
24	Evaluating the quality of antihypertensive drugs in Lagos State, Nigeria	South-west Lagos State	Cross-sectional Survey	2019	102 drug samples	Registered Pharmacies, Branded Nifedipine product	Non-registered pharmacies, non-branded products	Branded antihypertensive drug samples.
25	Determinants of Willingness to pay for pharmacists provided medication-related services among outpatients in south-eastern Nigeria	South-east Enugu State and Anambra State	Cross-sectional descriptive survey	2018	466 patients	Adult patient 18 years and above	Patients that are mentally unstable	Questionnaire

	Teaching Hospitals.							
26	Assessment of the knowledge, attitude and practice of pharmacovigilance by pharmacists in two states in south eastern Nigeria	South-east Abia State and Imo State	Cross-sectional survey	2017	169 Pharmacists	Community Pharmacists and Hospital Pharmacists	Pharmacists in Academia and other areas of practice not hospital or community.	Questionnaire
27	Availability and utilization of drug information center, drugs and therapeutic committee and standard treatment guidelines in the management of HIV/AIDS patients at public hospitals in a north-central state, Nigeria	North-central state	Cross-sectional qualitative study	2019	10 Prescribers and 7 Dispensers	Prescribers and dispensers working HIV/AIDS clinic	Prescribers and dispensers not working with HIV/AIDS patients	Structure, audio-taped interview
28	Assessment of Information accessibility and utilization by state agencies for the control of HIV/AIDS in North Central state of Nigeria	North-Central states	Prospective Cross-sectional survey	2016	113 field workers	State Agencies field officers working with HIV/AIDS patients	Non-state agency field workers	Questionnaire
29	Evaluation of the readiness for collaborative practice between pharmacists and doctors for better drug	South-south Ikot-Ekpene	Prospective cross-sectional study	2012	139 members of a health care team	Physicians and Pharmacist within the institution of study	Other healthcare professional	Questionnaire

	utilization in an urban setting							
30	An investigation of drug information needs of doctors and nurses in Benin city, Nigeria	South-south Edo State	Prospective Cross-sectional survey	2018	205 Doctors and 171 Nurses	Doctors and nurses in Benin willing to participate	Those not willing to participate. Other healthcare practitioners	questionnaire
31	Utilization of internet and non-internet-based drug Information resources by pharmacists practicing in hospital and community settings in Kaduna, Nigeria	North-west Kaduna State	Cross-sectional survey	2018	110 Pharmacists	Pharmacist in Hospital and community setting	Pharmacists in settings other than hospital and community practice	Questionnaire
32	Information sources and utilization patterns of Pharmaceutical scientists in Nigeria.	National	Prospective Survey	2002	25 Pharmaceutical Scientists	The subjects comprised of 13 pharmacists, 7 chemists, 2 microbiologists, 2 biochemists and I food technologist.	Non-Pharmaceutical Scientists	Questionnaire
33	Community Pharmacists' Perception of the Relevance of Drug Package Insert as Source of Drug	South-West	Prospective cross-sectional study	2013	61 Community Pharmacists	Community Pharmacists	Pharmacist outside community practice	Questionnaire

	Information in South-western Nigeria							
34	Assessing Prescribers' awareness of essential medicine list, hospital drug formulary and utilization of standard treatment guidelines in a tertiary healthcare facility in North-Central Nigeria	North-central	Cross-sectional descriptive study	2018	70 Medical Doctor Prescribers	Prescribing Physicians	Non-Prescribers	Questionnaire
35	Rational Use of Medicines in Nigeria: A Critical Review	National	Bibliometric review	2014	61 articles	Articles on the topic of study between 1985 and 2013	Articles before 1985 and those beyond 2013	Published articles
36	A Survey of the Needs and Utilization of Health Information among Young Adults in Abeokuta, Ogun State, Nigeria	South-west Ogun Stat	Correlational descriptive survey	2015	1,500 students	Students below within the ages of 16-24 years. Students of the selected institutions	Students outside the ages of 16-24 years or outside the institution of the survey	Questionnaire
37	Utilization of Electronic Drug Information Resources by Pharmacists Practicing in Hospital and Community Settings in	North-east Maiduguri	Descriptive Survey	2020	50 Pharmacists	Pharmacists in Community and Hospital practice	Pharmacists outside community and hospital practice. Pharmacists outside	Questionnaire

	Maiduguri, Nigeria						Maiduguri	
38	Drug promotion in a Resource-constrained Nigerian Environment: A Cross-sectional Study of the Influence of Pharmaceutical Sales Representatives on the Prescribing Behaviors of Medical Practitioners in Abiah State	South-east Abia State	Cross-sectional study	2017	185 Medical Doctors	private and public medical practitioners in Abia State who participated in the CPD program and General Meeting of Nigerian Medical Association, Abia State Branch.	Non-medical practitioners	Questionnaire
39	Drug and therapeutics committees in Nigeria: evaluation of scope and functionality	National: South-West; South-East; South-South; North-Central; North-West	Cross-sectional study	2018	12 tertiary hospitals	Tertiary health care facilities	North-eastern zone of the country due to insurgency	Questionnaire
40	Drug promotional activities in Nigeria: Impact on the prescribing patterns and practices of medical	National South-west, South-east, North-central and	Cross-sectional survey	2018	176 Physicians	Tertiary hospitals	Primary and secondary tier hospitals	Questionnaire

	practitioners and the implications	North-west.						
41	Perception and utilization of public health services in Southeast Nigeria: Implication for health care in communities with different degrees of urbanization	South-East	Cross-sectional qualitative survey	2016	380 Households	Households within the selected Local Government in Imo and Enugu States	Households outside the selected LGA in Imo and Enugu	Structured questionnaire
42	Use of Internet Health Information Resources and Information Seeking Behaviour among Health Professionals in Federal Medical Center, Abuja	North-central Abuja	Descriptive Survey	2017	49 registered users of the library	Health Professionals in the Federal Medical Center who are registered users of the library	Health professionals outside the FMC. Non-users of the library	Structure questionnaire
43	Impact of pharmaceutical care interventions on the occurrence and resolution of drug therapy problems in antiretroviral drug therapy.	South-East	Prospective study	2013	1,473 patients	HIV/AIDS patients who have been in the hospital for at least 9 months.	Patients whose treatment will last less than 3 months. New patients Regular patients	Prescription and patient's medical records and oral interview
44	Identification of Drug Therapy Problems in Patients with Diabetes Treated	South-south Benin	Prospective descriptive survey	2011	40 diabetic patients on	Diabetic patients on bed	Non-diabetic patients and ambulato	Questionnaire

	in a Secondary Care Facility in Benin City.				admissio n		ry diabetics	
45	Assessment of knowledge of medication management among adults with diabetes mellitus in a Nigerian Teaching Hospital	South-west Ogun State	Cross-sectional study	2015	152 diabetic patients	Diabetics 18 years and above, coherent and stable	Less than 18 years, incoherence or confused state, duration of diabetes care less than six months	Questionnaire
46	Pharmaceutical Care Implementation: A survey of Attitude, Perception and Practice of Pharmacists in Ogun State, South-Western Nigeria.	South-west Ogun State	Cross-sectional prospective study	2011	105 Pharmacists	Hospital and community Pharmacists	Pharmacists in practice areas other than hospital and community	Questionnaire
47	Readability of Malaria Medicine Information Leaflets in Nigeria	North-central Jos	Prospective study	2011	45 Artemisinin-based antimalarial drugs	Leaflets of Artemisinin-based Anti-malarials registered by Nigeria's National Agency for Food, Drug Administration and Control (NAFDAC)	Non-artemising-based antimalarials and those not registered with NAFDAC	Drug leaflet inserts

48	Assessment of Hospital Pharmacy Services in South-Eastern Nigeria	South-east	Cross-sectional prospective survey	2010	123 Pharmacists	Registered pharmacists in the hospitals of study	Non-hospital pharmacies	questionnaires
49	Assessment of knowledge and roles of patent medicine vendors in the implementation of national malaria treatment policy in Nigeria.	South-east Enugu	Descriptive Cross-sectional study	2016	41 patent medicine vendors	Registered Patent Medicine Vendors within Nsukka	Non-registered PMVs and those outside Nsukka	Interviewer-administered questionnaire
50	Community Pharmacy in Warri, Nigeria – A Survey of Practice Details	South-south Warri	Cross-sectional Survey	2013	57 community Pharmacists	Retail Pharmacies with registered Pharmacist	Non-retail pharmacies and those without registered pharmacist.	Questionnaire
51	Internet Accessibility and Use of Online Health Information Resources by Doctors in Training Healthcare Institutions in Nigeria	South-west	Descriptive survey	2015	901 Resident Doctors	Resident Doctors in institution of the study	Non-resident Doctors	Questionnaire
52	Physicians utilization of internet medical databases at the tertiary health institutions in Osun State, South West, Nigeria	South-west	Descriptive survey	2011	444 Physicians	Physicians	Other health professionals	Questionnaire

53	Drug prescription pattern in a Nigerian Teaching Hospital.	South-west Lagos	Descriptive cross-sectional study	2017	621 patients	Out-patients case files	Case files outside OPD.	Patients case files

Table 2: Focus of studies on DIS in Nigeria according to geo-political zones distribution.

S/N	Geopolitical zone	Number of Studies n (%)	Study Focus
1	South-east	10 (24.39)	DI sources, Attitude and Perception to DI and influence of DI on prescribers
2	South-west	11 (26.83)	Relevance of DIC, Need, Access and Influence of DI on prescribers
3	South-south	6 (14.63)	Investigation of DI needs and practice patterns of health professionals
4	North-east	1 (2.44)	Utilization of DI resources
5	North-west	2 (4.8)	Utilization of DI resources
6	North-central	5 (12.20)	Availability of DI
7	Nation Wide	6 (14.63)	Drug service regulation and management
	Total	41 (100)	

DI-Drug Information

Table 3: Assessment of Studies on Drug Information Services in Nigeria based on Oxford Center for Evidence-Based Medicine's Levels of Evidence from Highest to Lowest.[53]

S/n	Level of evidence	Definition	n (%)
1	1A	Systematic Review of RCTs	1(2.44)
2	1B	Individual RCTs	0 (0.00)
3	2A	Systematic review of cohort studies	0(0.00)
4	2B	Individual cohort studies, Low quality RCT	1(2.44)
5	2C	Ecological studies	1(2.44)
6	3A	Systematic review of case-control studies	0(0.00)

7	3B	Individual case control studies	1(2.44)
8	4	Case series, poor quality cohort and case control studies	37(90.24)
	Total		41(100)

Table 4: Assessment of studies on Drug Information Services in Nigeria based on the Scottish Intercollegiate Guidelines Network for hierarchy of Study Type.[54]

S/N	**Study types according to hierarchy**	**n (%)**
1	Systematic review and Meta-analysis	1(2.44)
2	Randomized Controlled Trials	0(0.00)
3	Nonrandomized intervention studies	1(2.44)
4	Observational studies	38(92.68)
5	Non-experimental studies	1(2.44)
6	Expert opinion	0(0.00)
	Total	**41(100)**

Table 5: Periodic distribution of articles on Drug Information Services in Nigeria

S/N	**Period of publication of Study**	**Number of articles published n (%)**
1	≤ 2000	0(0)
2	2001 - 2010	4(9.76)
3	2011 - 2020	37(90.24)
	Total	**41(100)**

Discussion

The establishment of the Medicine Information Centre in Lagos by the PSN marked the flag-off of institutionalized Drug Information Services in Nigeria. This center operated on the standard of 8-hour service 5 days a week with the set target of answering urgent inquiries within 2 to 24 hours. The services provided by the MIC include: atending to drug information requests, creating awareness on drug and related materials through bulletins, journals etc., education for healthcare professional, pharmacy students and pharmacy residents, ensuring quality assurance other DI services by checking written materials such as memos about medicines, and ensuring new medicines update and offering advice

to drug and therapeutic committee on new drugs.[3] Since then, drug information centers have been set up in different tertiary institutions across the country which are supposed to operate replicating the model of the MIC. These DICs are expected to function in line with the global standard operations for Drug information services. Although there are a few studies on the awareness of the healthcare professionals and the people toward the provision of DIS[33], there is still sub-optimal utilization of the of DIS by the physicians, other healthcare professionals and the general public in Nigeria. This could be due to paucity of imposing studies which assess DIS and showcase the level of operation of the DICs in the country. As shown in Tables 3 and 4, there was high incidence of non-experimental studies in the country on the subject of DIS.

In the 90s especially in more developed countries, studies have recommended the strengthening of skills in the use of advanced technology for digital management of the broadening DI among pharmacists.[55] Whereas the result in Table 5 showed no articles on the subject of DIS within that period in Nigeria. The following decade (2001-2010) recorded minimal number of studies on Drug Information Services. But within the last decade, the number of studies on DIS showed a great leap. This was probably because the DIS belongs to the expanding areas of pharmacy practice that started being recognized and accepted in Nigeria only in the very recent past. This is consistent with the finding of Ogbonna *et al*[11] on the subject of pharmaceutical care in the country. Even so, the DIS in Nigeria has remained largely analog due to poor power supply and poor internet access to the majority of the populace, unlike in some developed countries like Switzerland, where healthcare professionals make use of printed DI reference materials out of choice and not due to lack of power supply or internet access.[5,6] The regional distribution of articles as seen from the result in Table 2 revealed that the highest number of studies were done in the South-West region followed by the South-east region of the country. The theme of the studies carried out in the south-west is mostly on the relevance of DIC, Need, Access and Influence of DI on prescribers while those of the south-east focused more on DI sources, Attitude, and Perception to DI and influence of DI on prescribers. The studies in the south-south focused on DI needs and practice patterns of health professionals. Studies from the north mainly focused on the availability and utilization of DIR. While the nationwide studies which made up the remaining part of the articles sited were generally on drug service regulation and management.

It is worthy of note that the first missionaries who brought education to Nigeria used the coasts in these two regions as their entry points, and the first port of call before going to the north. There are a lot of educational institutions in the western and eastern parts of southern Nigeria, and there is higher interest in education in these areas among the populace unlike the north where there is more nomadic interest, and influence. The shifting of the Federal Capital Territory to the North-central, brought a lot of development and the migration of more people from other parts of the country to that region. This may account for the region recording more articles than any other part of the north. While little articles came from the North-west, the North-east only had fewer number of articles cited. This situation is most probably a consequence of the interruption of educational engagements due to insecurities engendered by banditry and religious unrest in that region.[57-62] This situation of insurgency was stated as limitation in some of the articles cited at the

national level in which researchers obtained data from all the other regions of the country except in the north-east region. Their research was interrupted by the insecurity situation of the region.[38,39] This was similar to the situation in the South-south that witnessed some level of disruption of socioeconomic activities. The few studies sited in the northern region focused on the availability and utilization of DIR.

Observational studies had the highest number of records as shown in Table 4 on the hierarchy of studies. Other types of the studies in the hierarchy were very minimal while RCTs and expert opinions had none. This is very poor when compared with the level of sophistication of the RCTs in most developed countries where a lot of RCTs and Review studies were carried out on aspects of modern pharmacy practice in community pharmacy and, hospital pharmacy practice settings.[63-65] The concept of drug information services as an aspect of modern pharmacy practice is still new in Nigeria. And most of the independent DICs are found only in tertiary institutions. The community pharmacy settings offer DIS on a less formalized level and studies on the documentation and quality control of such activities in the community pharmacies at record time are non-existent in Nigeria. There is presently little or no evidence of effective coordination of networking among the existing DICs for sharing of information and creation of information pool that could become an authoritative reference point for drug services in the country.

Most of the studies cited were surveys carried out using questionnaires as the instrument of study. A few of them used patient case files, prescriptions, and drug leaflet inserts. And the majority of the studies were carried out in hospital and community pharmacy settings. A few of the studies involved other healthcare providers but most of them were focused on pharmacists. As portrayed by Table 3 on Evidence-based Medicine Evidence level, Case series, poor quality cohort, and case-control studies have the highest score while systematic reviews were the poorest with no score, except for the systematic review of RCTs which had very low score like the rest of the other studies. This shows that DIS fledgling and studies about it in Nigeria is still at its primary level. However, the activities and operation of the existing DICs in Nigeria are aligned with that obtainable in the long-standing DICs, in more developed countries as portrayed by studies. According to a survey on DICs carried out in the United States, some of the DICs have long-standing existence. According to most of the DICs the precepting of pharmacy student was very high. Training of Pharmacy Residents were the most commonly reported activities and the average DI requests was received per month.[66]

In another survey carried out in the United States and Puerto Rico, DICs were found to be more affiliated to hospitals and schools of pharmacy. This is similar to the situation in Nigeria where most of the DICs were found in tertiary hospitals and precept students from the Universities. The report of that survey also has it that although the number of DICs have recorded a decrease in the past three decades, with only half having a formal quality assurance program, yet the DI pharmacist are now more trained than in the past and engage more in the training of students and residents.[67] This is also consistent with the situation in Nigeria where some of the DICs are staffed with pharmacists who were fellows of the West African College of Pharmacists and who serve as preceptors for pharmacy students, and residents[47]. Since the global recommendation has been that the Drug and Poison Information Manager be a Pharmacist who is specially trained to handle the complexity of the task[68,69],

therefore this appears to be a step in the positive direction for DIS in Nigeria as high-ranking DIS managers are more likely, armed with their level of professional knowledge and skills, to render more quality and reliable DI.

Conclusion

Due to the paucity of studies on DIS from some parts of the north as a result of disruptions from insurgency, the opportunity for greater DIS provision in that region has remained untapped. Many of the articles cited were studies carried out on hospital and community pharmacies. There is a high distribution of non-experimental studies on DIS. And the studies fell short of the Oxford and Scottish benchmarks for the hierarchy of studies showing that the DIS in Nigeria is still at its primary level.

Limitations

Search term limitations could have occurred in the study.and some of the studies cited may have some level of bias which escaped elimination. Efforts were made to overcome limitations by using search terms individually and in series. Truncation was also applied where necessary

The method of presenting tables and data in the present study was purposively chosen for simplicity and clarity.

Abbreviation

TISHIP - Tertiary Institutions Students Health Insurance Scheme
NHIS - National Health Insurance Scheme
CPD - Continuing Professional Development
DIS - Drug Information Services
DIC - Drug Information Centre
LGA – Local Government Area
PCN – Pharmacists Council of Nigeria

Conflict of Interest

The authors have none to declare.

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