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Research Article

Pediatric Pharmaceutical Care Services in Nigeria from 1980 - 2023: A Narrative Review Study

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Abstract

Background: Pediatric pharmaceutical care is a new concept in the pharmacy profession. The knowledge of pediatric pharmaceutical care in Nigeria is limited, which may have negative consequences on pediatric pharmaceutical care and treatment efficacy and safety. In developed countries child healthcare is taking as first to non, as it is perceived that children are the future leaders, and as such all available pharmaceutical and financial resources are channeled into seeing that the best possible pharmaceutical care is rendered, watching out for best possible outcomes. While the concept of Pediatric pharmaceutical care is still in its infancy in Nigeria, the state and extent of Pediatric pharmaceutical care studies in health services remain largely unknown in Nigeria.

Objective: This study described pediatric pharmaceutical carestudiesin Nigeria.

Method: This study adopted narrative review in describing pediatric pharmaceutical care service studies in Nigeria. The study was a retrieved literature search conducted on computerized databases. Search terms were used singly, and in combination, using truncation where needed. Only studies carried out in Nigeria and written in the English Language from January 1980 to December 2023 were examined. Data obtained were subjected to descriptive statistics of frequency, percentage, and comparative assessment using the Oxford and Scottish Benchmarks for Study Standard. The study lasted from January to May 2024.

Result: A total of 11 articles were used for the study. Studies carried out in south-south had the highest incidence 4(36.36%) respectively, followed by South-west 3(27.27), South-east 2 (18.18). Nationwide, and north-west had the same number of articles selected 1(9.09%) respectively, apart from north-central and North-east 0(0.00%). The studies fell within the lower half of the Oxford and Scottish benchmarks for the hierarchy of study types. Which implies poor policy making and intervention, due to an ineffective healthcare system, and this may lead to a negative outcome on the patient health.

Conclusion: Most of the studies were majorly carried out in the Southern, western, and eastern parts of Nigeria. Systematic, narrative review and others of pediatric pharmaceutical care studies in the country were absent. Pediatric Pharmaceutical care activities fell within the lower half of two standard benchmarks for the hierarchy of studies.

Key words: pharmaceutical care; pediatrics; pharmacist; children; healthcare services; outcome; nigeria; review

Introduction

Children represent a significant proportion of the population requiring pharmacy services in a variety of hospital and community settings; as such, pharmacists play an essential role in pediatric care [1-3]. Due to advances in pediatric medicine, the increasing complexity of childhood diseases and unique dosing and pharmacokinetic challenges, there is growing need to educate pharmacists in basic pediatric competencies. Furthermore, it is estimated that the use of prescription medications among pediatric patients is substantial; according to the Centers for Disease Control and Prevention, 14–20% of patients under 19 years old surveyed in 2008 reported having used at least one prescription drug in the preceding month [4,5]. As a result, pharmacy curricula should emphasize a minimum level of pediatric pharmacotherapy competence; this could potentially help to lower the rate of pediatric medication errors [6].

The provision of pharmaceutical care to children can be challenging, especially with regards to the appropriate drug, dosage and route of administration. Because of their relative lack of chronic ailments, children usually require fewer medications compared to adults; this, compounded with the various ethical and logistical barriers to studying the effects of medications among children, means that there are very few medications licensed for use among children [7]. Medications without the proper marketing authorization are referred to as 'unlicensed', while off-label medications indicate licensed medicines which are prescribed or used in a manner not consistent with recommendations, for instance in terms of dose, route of administration or recommended age.

Also, allocation of pediatric pharmacy services is often extrapolated from analysis of both internal and external pharmacy services provided to an adult population, despite multiple studies, national organizations, and regulatory bodies that say providing safe pediatric pharmacy services poses unique challenges. More resources are required to prevent adverse drug events in the vulnerable pediatric population. Allotting pediatric pharmacy resources based on extrapolated adult census data per pharmacist or adult medication order per pharmacist grossly underestimates what is needed to provide safe, comprehensive pharmacy services to pediatric patients. Despite recommendations from numerous health care bodies, including The Joint Commission, the American Academy of Pediatrics (AAP), Pediatric Pharmacy Advocacy Group, and the American Society of Health-System Pharmacists, some hospitals that care for children have failed to establish robust pediatric pharmacy services [8-10].

According to the United Nations, 37.7% of the population in Jordan is under 14 years old. [11] Moreover, pharmacists in Jordan often act as primary care providers as, for financial reasons, they are often the first and only port of call for healthcare advice and medicine use by patients. Wazaify *et al.* also reported that pharmacists in Jordan often dispense non-prescribed medications, including antibiotics. [12] As such, it is imperative that pharmacists in Jordan have the necessary knowledge to provide safe and adequate care to pediatric patients, including the information needed to dispense medications and counsel pediatric patients or their guardians [13]. However, due to a lack of national guidelines regarding pediatric care, pharmacists often rely on knowledge received during their education and training. The present study aimed to explore the self-reported knowledge, attitudes and competency of final-year pharmacy students in Jordan regarding pediatric pharmaceutical care, including assessment, treatment and dosage. To the best of the authors' knowledge, this is the first study to directly explore pharmacy students' perceptions and attitudes regarding this topic.

Despite mounting evidence regarding the value of pharmaceutical care services, little is known about pharmaceutical care services on the pediatric population in Africa and Nigeria at large. Given this observation and the demonstrated need for pharmacists to provide and make pharmaceutical care services available to the delicate pediatric population, despite the challenges associated in delivering these services. Howbeit, it is important to understand that pharmaceutical care services are a unique aspect of pharmacy practice that benefits the patient with lots of positive outcomes. But there is a huge lacuna on delivering pharmaceutical care services to the pediatric population. Thus, this study presented an overview of pediatric pharmaceutical care services in Nigeria and generated information for intervention, and policymaking.

Methods

Study Area: The study covered pediatric pharmaceutical care services carried out in Nigeria

Review question: What is the extent and nature of pediatric pharmaceutical care services in Nigeria?

Study population and type of studies included: The search was carried out on PubMed and Google Scholar, for all pediatric pharmaceutical care studies. Manual search was done for studies that met the inclusion criteria. This ensured retrieval of relevant studies while focusing on the study objectives.

Eligibility criteria:

Inclusion criteria

• Studies published in English language

• Peer-reviewed papers were eligible for inclusion

• Pediatric pharmaceutical care studies conducted in Nigeria irrespective of the region

• Studies with defined protocol and study design either experimental or non-experimental

• Studies with no conflict of interest stated

•Studies that provided other information that may help to understand pediatric pharmaceutical care services

• Studies with clearly stated and defined research design.

Exclusion criteria

• Studies without a clearly defined period, duration, sample size, and location were discarded

• Studies with methodological flaws

• Studies with incomplete data.

Study design: The study was a narrative overview of pediatric pharmaceutical care services in Nigeria.

Risk of Bias: The included studies were assessed for subjects and sampling selection bias, reporting bias before selection.

Condition and Domain studied: Pediatric pharmaceutical care studies and articles that described pediatric pharmaceutical care service activities in Nigeria.

Data extraction was done in accordance with the standard reporting protocol for narrative reviews [14].

Information source: Search was conducted using Google Scholar and PubMed.

Data items and Summary Measures: The data synthesized were sought for study location, design, sample size, year of publication, inclusion criteria, exclusion criteria, year of publication, study instrument, title of publication. Articles that met the inclusion criteria irrespective of their year of publication were selected.

Context: The study covered pediatric pharmaceutical care services carried out in Nigeria.

Articles search process: The graphical illustration in the figure below (Fig.1) shows how the search was conducted. The related keywords to the title of the study were used for the search. PubMed and Google Scholar were used to search for studies and articles on pediatric pharmaceutical care services in Nigeria published between 1980 and 2023. Additional words found appropriate and relevant to the title and objective of the study were utilized. A total of 455 articles were obtained, 155 came from PubMed and 300 articles from Goggle Scholar. These articles were assessed for eligibility based on the inclusion criteria.

Study period and duration: The study lasted from April to May, 2023 and covered peer-reviewed articles published from January 1980 to December, 2023.

Ethical approval: Ethical approval is not applicable here. However, only studies with ethical approval were included and utilized in the review process.

Data analysis: Data was summarized with descriptive statistics.

Study articles selection process: A total of 455 articles were obtained, 155 came from PubMed and 300 articles from Goggle Scholar. These articles were assessed for eligibility based on the inclusion criteria. Overall, 275 studies that fell outside the scope of Pediatric Pharmaceutical Care Services were discarded giving rise to 180 articles. On further screening, 120 articles with invalid and incomplete study designs were eliminated, and another 49 articles with incomplete follow-up data which gave rise to 11 studies 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 [15]. 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.

Results

Reference	Title	Location	Design	Year of publication	Sample size	Inclusion	Exclusion	Study instrument
[16]	Management of acute diarrhea in children by community pharmacists in Lagos, Nigeria	South-west	Descriptive cross-sectional survey	2014	202	Registered retail community Pharmacist	Non-Registered retail community Pharmacist	Questionnaire, Data collection form
[17]	**1** Community Pharmacists' Knowledge and Attitudes towards Pediatric Pain Management in Nigeria	North-west	Descriptive cross-sectional survey	2021	623	Pharmacist who attended the 38th Annual National Conference of the Association of Community Pharmacists of Nigeria (ACPN)	Pharmacist who attended the 38th Annual National Conference of the Association of Community Pharmacists of Nigeria (ACPN) and unwilling to participate	Questionnaire
[18]	**2** Drug pooling: A cost-saving strategy to enhance antibiotics availability for pediatric in-patient in Nigeria	South-east	Mixed-method approach	2019	53	Caregivers of in-patient children, nurses, physicians and pharmacists	Non-Caregivers of in-patient children, nurses, physicians and pharmacists	Focus groups, interviews and medical records
[19]	**3** Bridging the gap in knowledge and use of antibiotics among pediatric caregivers: comparing two educational interventions	South-south	Prospective cross-sectional study	2023	60	Pediatric care givers	Non-Pediatric care giver	Questionnaire
[20]	**4** Incidence and cost estimate of treating pediatric adverse drug reactions in Lagos, Nigeria	South-west	Prospective observational study	2011	2004 admitted children	Children admitted to the pediatric wards of the Lagos State University Teaching Hospital (LASUTH) in Nigeria, between July 2006 and December 2007.	Children not admitted to the pediatric wards of the Lagos State University Teaching Hospital (LASUTH) in Nigeria, between July 2006 and December 2007.	Prescriptions
[21]	**5** Knowledge and indulgence in substance abuse among adolescents in Anambra State, South-East Nigeria	South-east	A descriptive cross-sectional study	2022	285	Adolescents aged 10 to 19 years recruited from an adolescent summer/long vacation camp in	Adolescents aged below and above 10 to 19 years recruited from an adolescent summer/long vacation camp in August of 2019 at Ozubulu	Questionnaire

						August of 2019 at Ozubulu		
[22]	**6** High levels of pre-treatment HIV drug resistance and treatment failure in Nigerian children	South-west	Observational prospective cohort study	2016	90-100	Age ≤12 years, confirmed HIV-1 test (positive HIV antibody test if age >18 months, or a positive HIV nucleic acid polymerase chain reaction (PCR) test if age ≤18 months), eligibility for initiation of first-line ART according to national guidelines at that time (all HIV-infected children <2 years of age, CD4 count <750 cells/m^3 in children 2 to 5 years and CD4 count <350 cells/mm^3 in children >5 years)	HIV-2 co-infection, anticipated non-compliance with the protocol and current participation in another study or clinical trial	Questionnaire
[23]	**7** Prescribing pattern and antibiotic use for hospitalized children in a Northern Nigerian Teaching Hospital	Northern Nigeria	A descriptive retrospective design	2018	3908	All eligible prescription orders for children below the age of 18 years that were on admission within the study period	Prescription orders that were not legibly written and considered not readable were not included, as well as those containing only intravenous infusions, consumable items, and vaccines. Any prescriptions without relevant client identity (age, registration number, and ward address).	Profoma
[24]	**8** Factors influencing adherence to pediatric antiretroviral therapy in Portharcourt, South- South Nigeria	South-south	A cross-sectional survey	2013	213	Caregivers and their children that consented to be interviewed	Caregivers and their children that never consented to be interviewed	Interview
[25]	**9** Assessment of the knowledge and practice of pediatric pharmacy among hospital pharmacists in Delta State, Nigeria	South-south	A cross-sectional survey	2013	90	Pharmacists working in the facility	Pharmacists not working in the facility	Questionnaire
[26]	**10** Drug prescribing and potential drug-drug interactions at the pediatric unit of a secondary health facility in Southern-Ijaw Local Government Area, Niger Delta Region, Nigeria	South-south	A descriptive, cross-sectional, retrospective study	2022	227	Pediatric patients in the facility within the specified time frame	Non-Pediatric patients in the facility within the specified time frame	Case note

Table 1: Evidence-based table of the characteristics of study articles

s/n	Geopolitical zones	No of Studies n (%)	Study Focus
1	North-east	0 (0.00)	
2	North-west	1 (9.09)	Knowledge, attitude towards pediatric pain, outcome
3	North central	0 (0.00)	
4	South-east	2 (18.18)	Knowledge, cost and Antibiotic Stewardship in pediatric pharmaceutical care service
5	South-south	4 (36.36)	Knowledge, attitude on pediatric care, drug therapy problems, adherence, pediatric pharmacy practice
6	South-west	3 (27.27)	Management, treatment, drug therapy problems and cost in pediatric pharmaceutical care services
7	Nationwide	1 (9.09)	Antibiotic Stewardship in pediatrics, adherence
	Total	**11 (100)**	

Table 2: Focus on studies on pediatric pharmaceutical care studies in Nigeria according to geopolitical zone distribution.

S/n	Level of evidence	Definition	n (%)
1	1A	Systematic Review of RCTs	0(0.00)
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	0(0.00)
5	2C	Ecological studies	0(0.00)
6	3A	Systematic review of case-control studies	0(0.00)
7	3B	Individual case control studies	0(0.00)
8	4	Case series, poor quality cohort, and case-control studies	11(100)
	Total		**11(100)**

Table 3: Assessment of Studies on pediatric pharmaceutical care studies in Nigeria based on Oxford Center for Evidence-Based Medicine's Levels of Evidence from Highest to Lowest [27]

s/n	Study types according to hierarchy	n (%)
1	Systematic review and Meta-analysis	0(0.00)
2	Randomized Controlled Trials	0(0.00)
3	Nonrandomized intervention studies	0(0.00)
4	Observational studies	11(100)
5	Non-experimental studies	0(0.00)
6	Expert opinion	0(0.00)
	Total	**11(100)**

Table 4: Assessment of pediatric pharmaceutical care studies in Nigeria based on the Scottish Intercollegiate Guidelines Network for hierarchy of Study Type [28]

S/n	Period of publication of study	No of Studies n (%)
1	≤2000	0 (0.00)
2	2001-2010	0 (0.00)
3	2011-2020	11 (100)
4	2021≤	0 (0.00)
Total		**11 (100)**

Table 5: Periodic Distribution of pediatric pharmaceutical care studies in Nigeria

Discussion

An Overview of Pediatric Pharmaceutical Care Services in Nigeria

Pediatrics is the branch of medicine that deals with the medical care of infants, children, and adolescents. It is a critical component of healthcare due to the vulnerability of children to diseases and other health conditions. Children represent a significant proportion of the population requiring pharmacy services in a variety of hospital and community settings; as such, pharmacists play an essential role in pediatric care.

In Nigeria, healthcare has been a challenge due to various factors such as inadequate facilities, low funding, and a shortage of health care professionals. These and other challenges have led to poor healthcare outcomes, especially in the pediatric population. Children in Nigeria face numerous health challenges such as malnutrition, malaria, pneumonia, and diarrhea, which contribute to high morbidity and mortality rates. While there is still much work to be done, these efforts are a step in the right direction and offer hope for the future of pediatric healthcare in Nigeria.

But the present-day collaborative care model (pharmaceutical care) evolved from the USA [29-32]. Also, the practice of different models of pharmacy practice from the traditional model of dispensing to the newly introduced model of pharmaceutical care, ensures that pharmacists take responsibility for the medication care they provide to the patient, and this

ensures collaborating with other healthcare personnel and most importantly with the physicians to ensure rational drug use.

Over the years, allocation of pediatric pharmacy services is often extrapolated from analysis of both internal and external pharmacy services provided to an adult population, despite multiple studies, national organizations, and regulatory bodies that say providing safe pediatric pharmacy services poses unique challenges. More resources are required to prevent adverse drug events in the vulnerable pediatric population. Allotting pediatric pharmacy resources based on extrapolated adult census data per pharmacist or adult medication order per pharmacist grossly underestimates what is needed to provide safe, comprehensive pharmacy services to pediatric patients [33, 34]. However, Observational studies were the best fit in accessing and analyzing the pediatric pharmaceutical service across various variables in Nigeria this corresponds to the distribution of the studies showing a higher incidence of non-experimental studies in the country. This could also be as a result of the relative ease in the conduct of an observational study than experimental studies.

Also, due to the reduced cost, manpower, and time employed for an experimental study. Most of the studies cited in the work were also carried out within the last decade as shown in table 1 and 5, recording 0 (0.00%) within the decade of 2001 to 2010 and the last following decade (2011-2020) recording 11 (100%) while the decade of 1980-2000 recording one cited work 0 (0.00%). This is largely because the concept of pediatric pharmaceutical care services evolved from the European countries [35], and it's been gradually adopted by the Nigerian government when because it is a patient/goal-oriented model which was introduced within the last 2 decades and it has been gradually the healthcare system for Health Care Providers.

Description of the pediatric pharmaceutical care services and the extent and nature of work done in Nigeria

Table 2 revealed the regional distribution of the articles and the study focus of each region. It showed that the highest number of studies were done in South-south 4 (36.36%) respectively, followed by the South-west 3 (27.27%), South-east 2 (18.18), and Nationwide and North-west 1(9.09%) of the country respectively, while North-east and North-central 0 (0.00%). The theme of the works conducted in South-east, South-west, and South-south comprised of the knowledge, attitude, adherence, drug therapy problems, cost and antibiotics stewardship in pediatric pharmaceutical care, while that of the North-west focused on knowledge and attitude towards pediatric pain and outcome, and nationwide focused more on adherence and antibiotic stewardship in pharmaceutical care services on the pediatrics.

Most of the works were done within South-east, South-west, South-south region possibly because the majority of the pharmaceutical schools and teaching hospitals are domiciled there and besides, it is easier to access your patients directly and deliver pharmaceutical care in these regions collaboratively with other health care providers due to less restriction to female genders as well as moral and societal impediments. The Nationwide studies also provided for comparative analysis between regions, states, and more within the year.

Description of pediatric pharmaceutical care and comparisons of the studies to the oxford and Scottish benchmarks for the hierarchy of clinical

As shown by Table 4 on the hierarchy of studies, observational studies were majorly all the number of records 11(100) %. Studies in the hierarchy other than nonrandomized intervention studies had no record as observational studies presumably were the best fit in accessing and analyzing the collaborative differentials across various variables.

Most of the studies cited were surveys carried out using questionnaires as the instrument of study, although the questionnaires were used directly on the respondents. A few of the studies involved pharmaceutical care but most of them were focused on pediatric care. As portrayed by Table 3 on the Evidence-based Medicine Evidence level, Case series, poor quality cohort, and case-control studies have the highest score of 11(73.68%) while ecological studies and the rest of the study with a 0% score. This shows that pediatric pharmaceutical care activities in Nigeria are poor. There is need for policy makers in the country to put into consideration the positive impact of the pediatric pharmaceutical care in patient outcome, and make better policies that can create a breeding-ground for better pharmaceutical care services. Future studies on pediatric pharmaceutical care that can meet up the benchmark for the hierarchy of studies is need to prompt an intervention in the healthcare system on pediatric pharmaceutical care that will affect the health of the pediatric patient positively.

Conclusion

Many of the articles cited were studies carried out on pediatric pharmaceutical carewithin the Nigerian healthcare system. Most of all the studies conducted were observational studies. There was no systematic review, meta-analysis, nor randomized clinical trial from all the articles used for this study. The studies fell short of the Oxford and Scottish benchmarks for the hierarchy of studies, which entails that studies that fall under systematic review, meta-analysis, and randomized control trials benchmark for the hierarchy of studies are strong studies because of their peculiarity, and specificity, studies below this benchmark for the hierarchy of studies are seen to be weak. The distribution of the studies recorded a higher incidence of the study conducted in South-east, South-west, and South-south as compared to the other various regions. However, the pediatric pharmaceutical care activities in Nigeria healthcare services are still at her infancy, as no one is interested in what happens between the pediatrics and pharmaceutical care services in the healthcare system, and this could be the reason why few articles were generated for the study. These studies are suggestive of a poor pediatric pharmaceutical care in Nigeria.

Limitations

The possibility of omission due to search and search terms limitations. Some of the studies cited may have some level of bias that escaped elimination which could have an impact on the outcome of the study. The method of presenting tables and data in the present study was purposively chosen for simplicity and clarity even though they could be better presentation formats.

Conflict of Interest

The authors have none to declare.

Grant/Sponsorship

None.

Highlights (Learning Points)

1. No narrative review article was found which reviewed the pediatric pharmaceutical care services in Nigeria over the past four decades.

2. The study articles on pediatric pharmaceutical care services cited since 2020 fell below the higher upper half of the Hierarchy of Study Type Standard Benchmark of Oxford and Scottish benchmarks.

3. Majority of the studies on pediatric pharmaceutical care services in Nigeria were carried out in South-east, South-west, South-south regions.

4. The theme of the works conducted in the South-east, South-west, South-south comprised ofthe impact of pediatric pharmaceutical care, knowledge, attitude, management, treatment, drug therapy problems, adherence and costwhile that of the nationwide focused more on the importance of pediatric pharmaceutical care on antibiotic stewardship and adherence. The studies in the North-west focused on knowledge, attitude,

and outcome of pediatric pharmaceutical care, while north-east and north-central had no cited study.

5. The present work is a narrative overview of pediatric pharmaceutical care in Nigeria healthcare services. It reviewed a general overview of the pharmaceutical care activities on pediatrics, revealed the studies conducted on the subject matter, showed the level of the work done, and gave a comparison of the available studies with some standard benchmarks for the hierarchy of study type. It also gave recommendations and provided documented information for intervention.

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