Research Article

EVALUATION OF ESSENTIAL MEDICINES MANAGEMENT IN PUBLIC HEALTH FACILITIES IN EKITI STATE NIGERIA

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Abstract

Access to affordable essential medicines is crucial in addressing patients' satisfaction and increasing their health-seeking behaviour. This study aimed to evaluate the management of essential medicines in public health facilities in Ekiti state, Nigeria. A cross-sectional study was conducted in six public health facilities using 30 tracer drugs. Data collection methods include semi-structured interviews with the key informants at the health facilities, review of the documents, and physical inspection of the health centres. The availability of the tracer drugs at the time of the survey, stock-out duration, lead time, storage facilities, and inventory management practices of the facilities were assessed. The average availability of essential medicines in the facilities was 68.85%. The average stock-out duration for the health facilities was 3 months, and the health facilities' storage condition was adequate. The average lead time was 28 hours, and the records corresponding to the physical count range were 46.67% to 100%. The specialist hospital performed better than the general hospitals in all the parameters assessed. Some of the causes of drug shortages identified by the key informants were; poor inventory management practices, lack of trained personnel, the delay in the release of funds from the hospital management, and the bureaucratic procurement process, as most of the drugs used in Nigeria are imported. The study also revealed that some essential medicines were out of stock throughout the six-month survey. Overall, the availability of essential medicines and stock-out duration was below the performance target. Staff training in proper record keeping, drug quantification, and good inventory management practices is needed. The government also needs to allocate more funds to the public health sector.

Keywords: Essential medicines, Health services research, Availability of medicines, Access to essential medicines.

INTRODUCTION

According to the World Health Organization (WHO), "Essential medicines are those that satisfy the priority health care needs of the population. Essential medicines are intended to be available within the context of functioning health systems at all times in adequate amounts, in the appropriate dosage forms, with assured quality and adequate information, and at a price the individual and the community can afford" (1). However, World Health Organization estimates that nearly 2 billion people worldwide lack regular access to essential medicines. More than 50% of the population living in different countries in Africa have no access to essential medicines when they need them (2). Since the first WHO model of Essential Medicines List (EML) was published in 1997, approximately 137 countries out of 194 WHO member states have formal national EMLs (70.6%) (3). Despite this progress, many low-and-middle-income countries still struggle to ensure access to essential medicines. The proportion reaches 50% in the poorest parts of Africa and Asia (4). According to a study on access to medicine and affordable treatment for acute and chronic diseases in 36 developing and middle-income countries,

the availability of generics in the public sector ranged from 29.4% in Africa to 54.4% in America (5). Some factors responsible for the poor availability and affordability of medicines in African countries include poor drug management systems, inadequate health financing systems, poor inventory management, inefficient medicine supply systems, and out-of-pocket payment for drugs (6). Furthermore, most low-and-middle-income countries are in their early stages of pharmaceutical development. Thus, they majorly import drugs, raw materials, and equipment from countries outside the region, mainly India and China (7). Nigeria is highly dependent on other countries for its medicinal needs. About 70% of the medicine used in Nigeria and most African countries are imported from India and China (8). The overall goal of the National Drug Policy in Nigeria is to ensure the availability, accessibility, and affordability of EMs at all times and to promote their rational use (9). Accordingly, a national list of EMs was developed; this list guides the decision of all health service providers in selecting the most needed medicines at every level of the healthcare system at an affordable price (9). However, despite adopting the EMs, access to medicines is still low in Nigeria (10). The World Health Organization/Health Action International (WHO/HAI) developed a standardized method for measuring the availability and affordability of medicines, which provides a

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means of comparison of results across countries (11). Previous studies ((12), (10), (13), (14)) utilized the WHO/HAI method to investigate the availability and affordability of medicines for different classes of medicines and reported variabilities. For example, an earlier study by (15), conducted in Nigeria using the WHO/HAI method, reported mean availability ranging from 2.4% in the public health sector to 34.1% in private pharmacies. However, to the authors' knowledge, no study has been conducted to evaluate the management of essential medicines in general and specialist public health facilities. Given the evidence of persistent poor drug management practices in public health facilities, the search for ways of improving the accessibility and availability of drugs in Nigeria and an effective drug management system remains a crucial concern in Nigeria.

Aim: The study aimed to evaluate the management of essential medicines in public health facilities in Ekiti state, Nigeria.

Specific objectives

- Identify the key essential medicines available at the health facilities and, if not, establish the major causes.
- To evaluate the average time the essential medicines at the public health facilities are out of stock and the average time between requisition and delivery of the medicines (lead time).
- Assess whether adequate conservation conditions are in place and whether medicines are appropriately handled.
- To examine whether effective inventory control systems are in place, establish levels of qualification of staff in charge of drug stores and the suppliers of drugs.
- Suggest ways of improving drug management at public health facilities.

METHODS

Study area

The study was conducted at HCs in Ekiti state, Nigeria. Ekiti state is in Southwestern Nigeria. There are sixteen local government areas in Ekiti state, with a total population of 2,398,957, according to the 2006 census (16). Six HCs were randomly selected as representatives; four general and two specialist hospitals. The general hospitals are namely; General Hospital Ise-Ekiti, Oba Adejughe General Hospital, General Hospital Ilupeju, and General Hospital Ayede. The specialist hospital includes State Specialist Hospital Ikere and State Specialist Hospital, Ikole. The availability of EMs was assessed on the date of the survey and the previous six months, from January 2022 to July 2022.

Study design

A descriptive and analytical cross-sectional study design was used in this research. Data was collected at one point in time and tried to describe the situation at that particular time. The drug records included manual ledgers, stock record cards, tally sheets, or computerized data present at the hospital pharmacies and dispensaries of the healthcare facilities.

Sampling technique

The study's inclusion criteria were the presence of a functional store and dispensary unit, EMs, and health professionals working at the site for at least six months. The presence of medical supplies, equipment, and reagents was excluded from the study. Thirty tracer drugs (TDs), which are representatives of EMs expected to be found in the HCs, were used to access the availability of EMs on the day of the survey and during the previous six months. Accordingly, the 30 tracer medicines selected include first-line medicine of the top fifteen morbidities according to the national standard treatment guideline. The list considers medicines and/or dosage forms for adults and children and medicines to alleviate common symptoms. The list closely follows the WHO model list of EMs (36) with modifications according to the needs of Ekiti state.

Data collection

Both qualitative and quantitative data were collected. A structured questionnaire adapted from Logistics Indicator Assessment Tool (LIAT) was used to collect data. The USAID developed LIAT-funded DELIVER, used to conduct an institution-based survey to assess health commodity logistics system performance and availability at health facilities (30). The questionnaire contains information about the availability of EMs, inventory management and procurement process, and storage and safety of drugs. Data was collected from facility records through observations and interviews with key informants at the HCs. The availability of TDs was assessed using an observational checklist to review data from bin cards. For example, a drug was considered available only if the data collectors physically saw it and it was not expired. The accuracy of stock records was evaluated by performing a physical count of the TDs to identify and estimate discrepancies between the recorded value and the counted value. The stock-out duration of the TDs was determined by reviewing the bin cards for the six months prior to the survey, from January 1, 2022, to July 31, 2022. Facility staff was also interviewed for the same purpose. A form consisting of a checklist was used to rate the condition in each drug store at each HCs. The rating for all the items on the checklist was summed up to obtain the rating for each facility. Two trained Pharmacists collected data. In addition, the data collectors were trained on the study's objectives and data collection techniques.

Data Analysis

Data were entered manually from the survey forms into master spreadsheets, checked, and cleaned by a system of double entries into twin spreadsheets for each survey form by separate research team members. Data were analyzed using Microsoft Excel, categorized, and presented graphically.

RESULTS

Availability of the tracer drugs at the public health facilities

Thirty essential medicines were assessed, and the average availability of the tracer drugs in the public health facilities was 68.85%, and a range of 60%-80%. Only one of the HCs was found to have greater than 75% availability of the basket of tracer drugs; however, none of the facilities had below 60%. Figure 1 shows the graphical representation of the results. The availability of the key drugs at the public health facilities was also compared for the general and specialist hospitals.
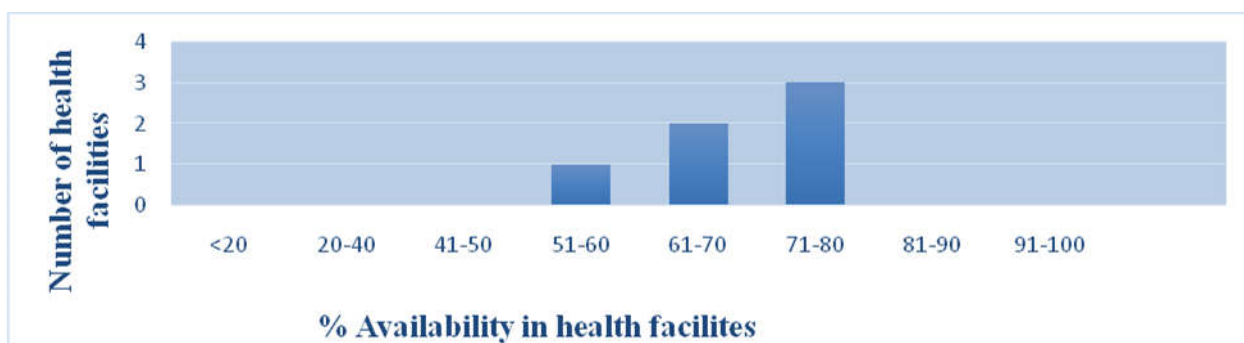
Figure 1. Percentage availability of essential medicines in the public health facilities

Figure 2. General-Specialist hospital comparison of availability of key drugs

Figure 3. Stock-out duration in the health facilities

The result indicates that the availability of the tracer drugs was 76.65% for the specialist hospital compared to 64.9% for the general hospitals. Figure 2 shows the result. One of the primary causes of drug shortages identified by the key informants was the delay in releasing funds from the hospital management. In addition, the Director of the Hospitals' Management Board, Ekiti state, emphasized lack of accountability, poor inventory management practices, and lack of trained personnel as the leading causes of drug shortages.

Stock out duration of the key drugs

The average stock-out duration in the survey period was approximately 3 months. The median stock-out duration was 2.74 months, while the range was from 1 month to 6 months. Facilities with a stock-out duration of more than 3 months constituted 50% of the study facilities. Figure 3 shows the results of the stock-out duration for the six months survey. As shown in Figure 4, the results indicate that the average stock-out duration for the specialist and general hospitals were 1.6 months and 3.9 months, respectively.

Average lead time from suppliers to the warehouse of the health facilities

Lead time is the time between initiating the purchase order and receipt of the goods at the warehouse from the selected supplier. The average lead time for all the facilities was 28 hours. Five facilities reported a lead time of 24 hours, and one facility reported 48 hours.

Adequate conservation conditions and handling of medicines

Inadequate storage and distribution can lead to physical deterioration and chemical decomposition, reduced potency, and, occasionally, the formation of toxic by-products of degradation (19). The study revealed that all the HCs had an adequate storage facility. Two of the three facilities with a maximum score of 11 were specialist hospitals. One of the general hospitals had a maximum score of 11, and the remaining two general hospitals had a score of 8-10. Figure 5 shows the percentage of compliance with each of the 12 minimum conditions for storage areas. The presence of expired drugs on the shelves of the drug stores in the health facilities was another factor used in assessing the quality of the drugs. The results show that only one health facility had 10% expired drugs on the shelves. The other five health facilities had 0% expired drugs on the shelves.

Effective inventory control system

The percentage of stock records corresponding to the physical count of drugs was used to measure inventory management performance. The average number of records that corresponded with the physical count at the time of the survey was 89.4%, with a range of 46.67% to 100% and a median value of 100%. The results are shown in Figure 6. The accuracy of the records was also compared for general and specialist hospitals.

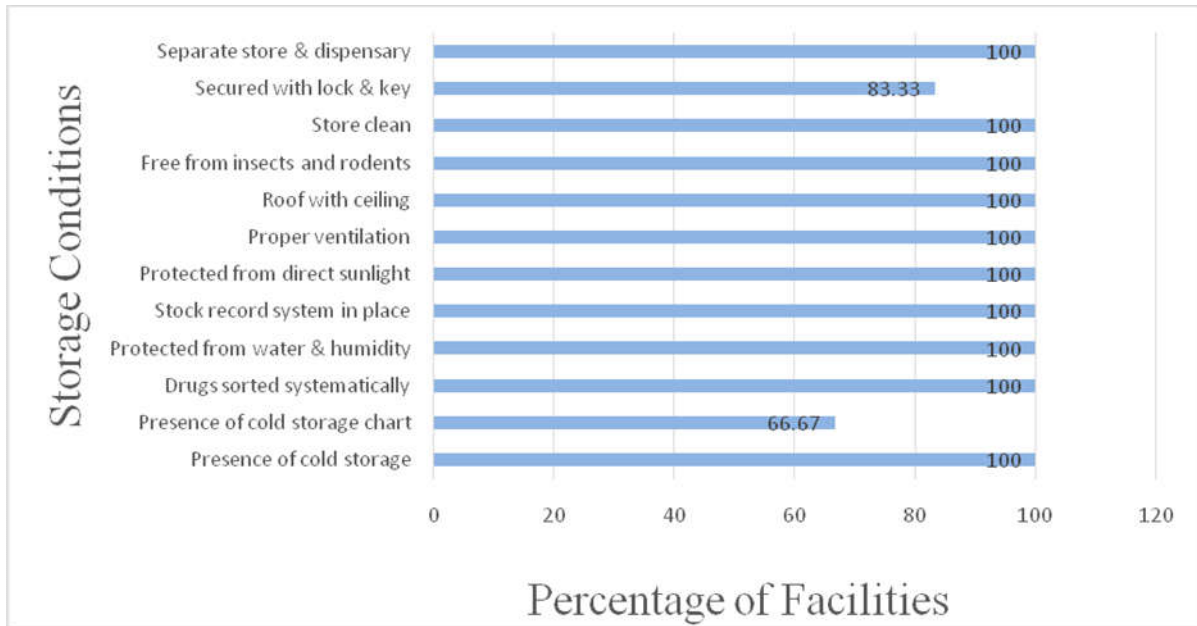**Figure 4. Specialist-General hospital comparison of stock-out duration**

Figure 5.Compliance with individual storage conditions
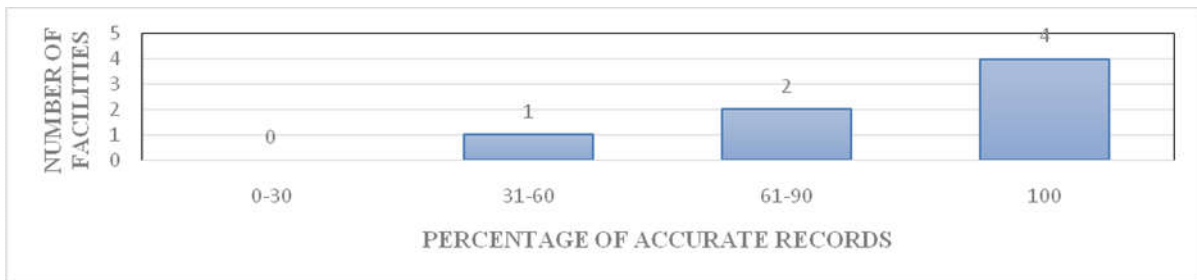

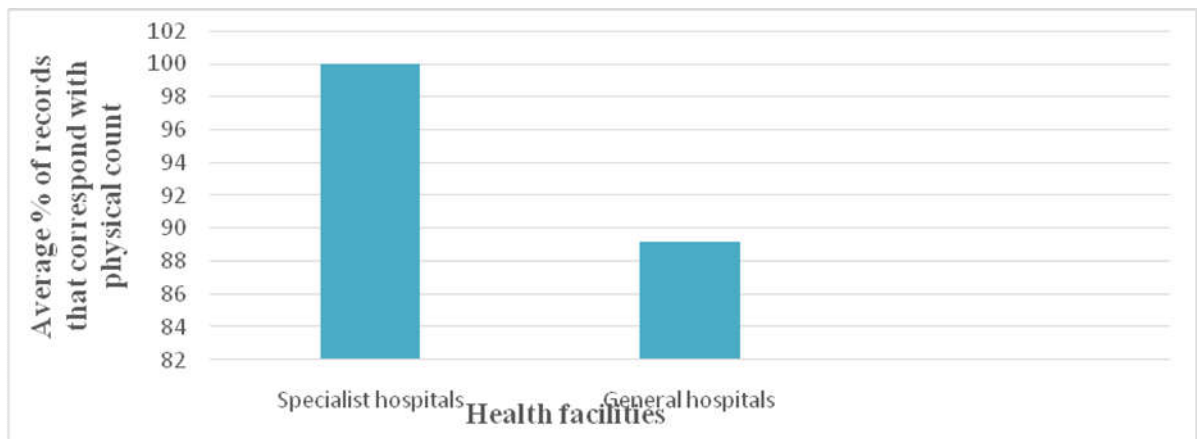**Figure 6. Percentage of records that correspond with physical count for health facilities**

Figure 7. Specialist-General hospital comparison of the accuracy of stock records

Table 1: Indicators and their Performance targets

Performance Indicators	Performance targets
Health units: Tracer drugs available (unexpired)	90%
Health units: average stock out duration for TDs	10 days
Stock records that correspond with the physical count	90%
Average lead time	30 days
Health care units with expired drugs	25%

Source: MSH, 1997

Both specialist hospitals had an average of 100% accuracy of stock records, while general hospitals had an average of 84.17%, with a range of 46.67% to 100%. Figure 7 shows details of the results. Also, the level of training of the staff in charge of the drug stores was assessed. The categories include pharmacists, pharmacy technicians, and stores manager. There were five pharmacists and one pharmacy technician. Among them, two were formally trained in logistics management.

DISCUSSION

Availability of the key drugs

The study revealed that the average availability of the TDs at the time of the survey was 68.85% which was below the performance target of 90% (20). Stock availability depicts a picture of the overall effectiveness and efficiency of the entire system, from forecasting and procurement to distribution, storage, and inventory management (19). Only one healthcare facility had an availability greater than 75%, and one of the facilities had a low availability of 60%. This implies that the patient could not access some of the drugs during their visit to the health facilities. Hence, they had to purchase their medications from private retail pharmacies or drug shops outside the health facilities, some of which the quality of their drugs could not be guaranteed. The average availability of key drugs in this study was within the same range as other studies conducted in some low-and-middle-income countries; India-56% (21), Uganda-62.5% (19), and Ethiopia-76.3% (14).

In a study conducted by Nkeiruka *et al.* in Nigeria, the availability of drugs ranged from 48% in public health facilities to 49.7% in private health facilities (10). The study also revealed that some essential drugs had not been available for over 6 months .in all the health facilities. The drugs are; include bisoprolol tablet, carvedilol tablet, tamoxifen tablet, dexamethasone eye drug, and tetanus toxoid. This trend can be attributed to their non-availability from the suppliers' end or to the fact that the HCs did not consider them a priority. Irrespective of how rarely a particular essential medicine is prescribed, a minimum quantity should be kept in stock. Furthermore, state specialist hospitals had higher average availability of 76.65% compared to 64.9% in general hospitals. This disparity could be because state specialist hospitals receive most of their funding directly from the state government. Hence, they go through a shorter length of bureaucracy than the general hospitals that receive funds from the federal government. The patients attending the HCs consist of those under health insurance and those paying out-of-pocket. Most of the private retail pharmacies in Nigeria are not accredited by the National Health Insurance Scheme of Nigeria (22). Due to the unavailability of EMs, patients, including those under health insurance, would have to purchase their medications in private retail pharmacies. Drugs in private retail pharmacies in Nigeria are expensive (10), thus increasing the financial burden on the patients and their communities.

Stock-out duration of the key drugs

The availability of key drugs on the survey day only reflects whether the facility can offer a service involving the related drug to the next patient(s) who visits the health facility. It does not represent continuous availability over time. An assessment of the average stock out duration provides a more in-depth look. The average stock-out duration was three months, which is very high compared to the performance target of 10 days (20). This value is higher than that obtained in similar studies in Ethiopia (40.6days and 31.7 days, respectively) ((14), (23)). However, it was in the same range as that obtained in a study conducted in Rwanda (1-3.5months) (24), and lower than 5 months stock-out duration obtained in Uganda (19). Some essential drugs were out of stock throughout the 6 months survey period. Commonly used TDs such as loratadine tablet/syrup, metronidazole tablet/syrup, amoxicillin/clavulanic acid tablet/syrup, amlodipine tablet, and lisinopril tablet, were out of stock for an average of approximately one month throughout the survey period. This could be attributed to the high utilization rates, inaccurate quantification, or limited resources. The state specialist hospitals had a lesser average stock-out duration than the general hospitals (Figure 4). This disparity can be due to the source of funding, better infrastructure, and specialist hospitals may be under closer supervision compared to general hospitals. However, the performance of both categories is still below the required standards.

Average Lead Time

Ekiti State Drug and Health Supplies Management Agency was identified as the supplier of drugs to the HCs and other health facilities in Ekiti state. The orders are first approved by the Head of the Pharmacy Department before being sent out to either of the suppliers. The average lead time for the facilities was 28 hours which conforms to the performance target. The HCs indicated that they receive their purchase order within 24-48 hours. However, the primary reason for frequent stock out was the delay in releasing funds from the hospital's management. The funds must be approved and released before the purchase order is sent to the suppliers. Another reason was that the supplier usually experiences drug shortages as most of the drugs used in Nigeria are imported. Also, the Ekiti State Drug and Health Supplies Management Agency to all HCs in Ekiti. This enormous task requires a high-level organization and an efficient logistic system. Besides the delay in sourcing the drugs and bringing them into the country, poor infrastructure and road conditions also play a role.

Adequate conservation conditions and handling of medicines

Drug stability depends on environmental factors such as temperature, air, light, humidity, and drug-related factors (25). Therefore, health commodities require specific procedures and conditions for safe storage to protect their integrity and effectiveness. All pharmaceuticals marketed in Nigeria must be registered with the National Agency for Food and Drug Administration and Control (NAFDAC). NAFDAC is also required by law to inspect and conduct tests on all the pharmaceutical products imported into the country. Therefore, it is expected that all drugs imported into the country should meet the minimum required standards. However, the quality of the drugs cannot be maintained unless they are appropriately

stored. As indicated in Figure 5, the HCs had adequate storage facilities, and only two storage conditions were not up to 100%. Therefore, it can be implied that the drugs in the HCs are of good quality and safe for use. The presence of expired drugs on the shelves was also used as a measure of the quality of drugs at the HCs. Only one facility had 10% expired essential drugs on the shelve.

Inventory Control System

Inventory management helps maintain a continuous supply to patients, preventing product stock out while minimizing the costs of holding inventory (14). Some of the respondents in the HCs identified the absence of a computer software system as a reason for poor record-keeping practice in the HCs. The average number of records that correspond with the physical count at the time of the survey was 89.4%, with a range of 46.67% to 100%. This discrepancy may indicate that for some of the medicines available in the HCs, a certain amount was damaged, lost, pilfered, or not updated after issuing. Other causes include inadequate staff training in logistic drug management and the use of paper-based Logistic Management Information Systems (LMIS). Mulugeta *et al.*, and Adane *et al.*, in studies conducted in Ethiopia, recorded a range of records corresponding with physical counts as 0% to 60% and 44.4% to 100%, respectively ((26), (14)). Other studies in low-and-middle-income countries have identified a weak supply chain management system, poor staff motivation, low budget allocation, and shortage of staff as contributing factors to the poor inventory management practices ((19), (27), (28)). Ideally, a health facility should not have discrepancies between the physical inventories and that on the bin cards. However, in practice, there is an acceptable level of error. More than 10% of errors generally indicate that efforts are required to improve inventory management practices (14).

Main suppliers of drugs

The Ekiti State Drug and Health Supplies Management Agency is the drug supplier to the HCs and other HCs in Ekiti state. They also experience stock-outs as most drugs are imported from outside the country. Most health facilities could not buy from other sources, most likely because of the hospital management's reluctance to give certificates of non-availability. More flexibility should be allowed so that health centres can purchase drugs from other sources if the suppliers do not have the drugs in stock. However, there has to be close monitoring to ensure that only drugs of good quality at reasonable prices are purchased.

Conclusion

The availability of EMs, stock-out duration, and accuracy of record keeping in the HCs were low. The major problem for all the HCs in the procurement process was the delay in releasing funds from the hospital management. This shows that Drug Revolving Fund (DRF) scheme has not been fully implemented in the HCs. In addition, the absence of computer-based LMIS and lack of adequate staff are challenges to proper inventory management practices in health facilities.

Policy recommendation

Based on the study findings, recommendations on improving drug management practices in public health facilities were developed. The following are suggestions for policy considerations:

1. The federal government should commit more funds to meet the drug requirements of public health facilities. In addition, stronger measures should be implemented to ensure the available resources are fully utilized efficiently.
2. The inventory management control needs improvement. More staff should be trained on proper record keeping and drug quantification. Also, paper-based record keeping is prone to errors and can be easily lost. Therefore, computerized LCIM should be gradually introduced into the health care system in Nigeria.
3. The efficiency of Ekiti State Drug and Health Supplies Management Agency can be improved by building better infrastructure. There is also a need for the pharmaceutical sector in Nigeria to manufacture drugs; this would reduce the dependence on imported drugs.
4. In cases of drugs being out of stock at the main suppliers, the hospital management should be swift in issuing certificates of non-availability so that other private sources of drugs can be utilized.

Limitation

Due to limited resources and time, the study included only six public health facilities in Ekiti state. Therefore, the findings may not necessarily be generalizable for the whole country. However, despite this limitation, the study offers significant insight into the state of essential medicines management in the public health sector in Nigeria. In this regard, therefore, the study is of importance to policymakers.

Future research

Further study of drug management practices of public health facilities of all the states in Nigeria should be conducted. Also, research into the role and performance of the private health sector should be carried out to get an overall picture of the situation in the pharmaceutical sector. There is also a need to assess the level of utilization of the drugs at the health centre level in relation to what is supplied from the main level. This can indicate what is lost in the drug distribution chain. There is also a need to explore other approaches for drug supply in public health facilities.

Statement of competing interests: The authors have no competing interests.

List of abbreviations

WHO- World Health Organization
TDs- Tracer Drugs
EMs- Essential Medicines
EKDHSMA- Ekiti State Drug and Health Supplies Management Agency
LMIS- Logistic Management Information Systems
HCs- Health Centres
DRF- Drug Revolving Fund
NAFDAC- National Agency for Food and Drug Administration and Control
LIAT- Logistics Indicator Assessment Tool
HAI- Health Action International

EML- Essential Medicines List
USAID- United States Agency for International Development

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