Exploratory Research in Clinical and Social Pharmacy 12 (2023) 100364

Contents lists available at ScienceDirect

Exploratory Research in Clinical and Social Pharmacy

journal homepage: www.elsevier.com/locate/rcsop

Exploring the logistics and supply chain services of HIV/AIDS facilities in north-western Nigeria

Kabiru Abubakar Gulma *

School of Global Health and Bioethics, Euclid University, Banjul, the Gambia

ARTICLE INFO

Keywords:
HIV/AIDS
Northwestern Nigeria
ART
PMTCT
Logistics

ABSTRACT

This study aimed to assess the logistics services of HIV/AIDS facilities in the northwestern states of Nigeria, with a particular focus on the National HIV/AIDS Supply Chain Unification Project. The project aimed to streamline the distribution of antiretroviral drugs, HIV rapid test kits, and co-trimoxazole by establishing a coordinated axial storage location for all healthcare facilities providing HIV/AIDS services in Nigeria. A field visit was conducted, covering hospitals under the Supply Chain Unification Project in the Phase 4 region, which includes Jigawa, Kano, Katsina, Kebbi, Sokoto, and Zamfara States. Fourteen (14) assessors visited one hundred and four (104) health facilities comprising thirty-nine (39) providing comprehensive care sites and sixty-nine (69) sites providing Prevention of Mother-To-Child Transmission (PMTCT) services. An adapted Logistics Indicators Assessment Tool (LIAT) was administered. Data were collated and entered into the pre-designed database on Microsoft (MS) Access. The significant gaps identified during this research included inadequately trained personnel, low levels of availability of Standard Operating Procedures (SOP) manuals, a dearth of firefighting gadgets, and non-use of Personal Computers (PCs) and internet availability for transmission of reports. All these require urgent attention from stakeholders in most of the sites visited. Findings were documented, with follow-up actions to be implemented as appropriate. Findings and recommendations have been communicated to the government, implementing partners, and sub-recipients supporting the facilities. It is expected that the findings from these visits will be used in developing appropriate solutions/next steps to improve the HIV/AIDS commodities supply chain management in the country.

1. Introduction

The HIV/AIDS supply chain unification project was an initiative to harmonize the distribution of antiretroviral drugs, HIV rapid test kits, and co-trimoxazole through a coordinated axial storage location for all health facilities providing HIV/AIDS services in Nigeria.[1] This became necessary because of the fragmented and parallel supply chains for the HIV/AIDS program that has been in place before now with inherent challenges.[2] The unified supply chain aims to improve the effectiveness and efficiency of the HIV/AIDS supply chain in-country for quality service delivery.[3] This project started in July 2012 with Cross River State Central Medical Store (renovated through the United States Government support and commissioned late last year) serving as the axial warehouse points for five states in the South-South/East part of the country.[4] It has further expanded since then, currently covering 30 states and FCT using different warehouse locations across the country.[4]

Health facilities in six northwestern states referred to as Phase 4 (excluding Kaduna State, which the Abuja warehouse supports) receive their supplies of HIV/AIDS commodities out of the Sokoto State Central Medical Store to support service delivery.[5,6]

The President's Emergency Plan for AIDS Relief (PEPFAR) funds the HIV/AIDS program in Nigeria. The Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFTAM) and the Federal Ministry of Health (FMOH) also fund the HIV/AIDS program in Nigeria.[7] Health facilities are supported majorly through PEPFAR implementing partners (IPs), Global Fund Sub-Recipients (SRs), and the Government of Nigeria.[8]

These stakeholders have been working collaboratively for the program's overall success in Nigeria, especially on supply chain management activities to ensure an uninterrupted supply of needed HIV/AIDS commodities at the health facilities.[9]

The health facilities provide HIV/AIDS services to clients and utilize commodities such as Antiretrovirals (ARV), Rapid Test Kits (RTKs), and Co-trimoxazole supplied by the Supply Chain Management Systems (SCMS) project.[10] An essential component of the HIV/AIDS program is

* Corresponding author.
E-mail address: gulma@euclidfaculty.net.

https://doi.org/10.1016/j.rcsop.2023.100364
Received 2 August 2023; Received in revised form 30 October 2023; Accepted 3 November 2023
Available online 7 November 2023

the logistics system, which comprises the central and facility levels.[11] The facilities send bi-monthly reports (Combined Report, Requisition, Issue, and Receipt Forms [CRRIRFs] and Patient Per Regimen [PPRs]) and requisitions to the central level for resupply, while the central level reviews the reports, provides feedback, and resupply commodities to the facilities through the distribution agents.[12] These facility-level reports are expected to drive the whole supply chain system, providing information for quality decision-making to ensure that the six logistics rights are met while preventing stock-outs and reducing expiries to the barest minimum.[12]

The aim of this study in the unified states providing Anti-Retroviral Therapy (ART), Prevention of Mother to Child Transmission (PMTCT) of HIV services, and HIV Testing and Counseling (HTC) services focused on overall supply chain support, mentoring, and capacity building of health service providers towards continuous improvement in supply chain performance. The study was also aimed at improving engagement with the government through the use of state officials, preferably pharmacists, serving as logistics focal persons during the entire exercise process. Finally, the visit availed the opportunity to identify supply chain challenges that will guide the overall feedback to the relevant state governments, implementing partners, and National HIV/AIDS Procurement and Supply Management Technical Working Group (PSM TWG) meetings for policy reviews and implementation.

2. Methodology

2.1. Ethical approval and informed consent

The research was conducted in compliance with ethical standards and guidelines, as approved by the Ethics Committee of the Federal Ministry of Health (Ethical Approval Number: 1/5–11/14). Prior to data collection, informed written consent was obtained from all study participants who had initially provided verbal consent.

2.2. Data collection tool review

The data collection instrument underwent a pre-research review to ensure its effectiveness in capturing pertinent information essential for the continuous support of the supply chain. Key data points included the physical addresses of healthcare facilities, the entities offering support in the context of ongoing site transitioning, facility classification (ART, PMTCT, or HTC), utilization of Logistics Management Information System (LMIS) tools, availability of Standard Operating Procedure (SOP) manuals, presence of adequately trained personnel in Logistics Management for HIV/AIDS Commodities, adherence to dispensing protocols, and the adequacy of storage facilities for health commodities.

2.3. Preparation and roster dissemination

To maintain the accuracy of the study, an updated roster of all healthcare facilities providing HIV/AIDS services across all six states was disseminated to the research teams prior to their field assignments.

2.4. Research team and state assignments

To ensure the integrity of the research in the six states, a team of 14 assessors was constituted, comprised of staff from the State Ministries of Health and selected experts from the study group. These assessors were distributed across the states as follows: Jigawa (2 assessors), Kano (4 assessors, forming two teams), Katsina (2 assessors), Kebbi (2 assessors), Sokoto (2 assessors), and Zamfara (2 assessors).

2.5. Initial contacts and planning meetings

Upon arrival in each state, the research team established contact with the Directors of Pharmaceutical Services or other high-ranking officials from the State Ministry of Health (MoH) and/or the State Agency for the Control of AIDS (SACA). Letters of introduction outlining the research objectives were addressed to the respective Honorable Commissioners of Health in each state and submitted through the aforementioned state officials. Subsequent to these initial interactions, planning meetings were convened with state MoH officials and collaborating partners to outline the research procedures.

2.6. Site clustering and selection

The clustering of the research sites was determined collaboratively based on the updated site list.

2.7. Data collection process

Data collection was conducted through one-on-one interviews with personnel from the pharmacy and laboratory units of the selected healthcare facilities, which primarily encompassed PEPFAR-funded ART and PMTCT sites. While the sampling method was random, priority was accorded to comprehensive care sites. The data collection instrument primarily comprised questions eliciting binary responses (Yes or No).

2.8. Data collection by assessors

The assessors completed the data collection checklists via interviews with logistics officers and by physically inspecting relevant aspects in line with the checklist criteria. This process was conducted in tandem with the pharmacy or laboratory unit personnel, as applicable.

2.9. Data aggregation and analysis

The collected data were subsequently aggregated into an electronic database utilizing Microsoft (MS) Access, configured to align with the indicators outlined in the data collection instrument. The aggregated data were subjected to query and analysis, focusing on prioritized indicators, to inform the discussions presented in this report.

3. Results

A total of one hundred and four (104) facilities were visited across the six states of the Phase 4 supply chain unification region. These comprise thirty-nine (39) ART facilities and sixty-five (65) PMTCT facilities.

4. Discussion

4.1. Facility characteristics and service provision

As presented in Table 1, a total of 104 healthcare facilities were assessed across the six states in Phase 4 of this study. Among these, 37% (39) offer Antiretroviral Therapy (ART) services, while 63% (65) provide Prevention of Mother-to-Child Transmission (PMTCT) services.

4.2. Personnel training in logistics management for HIV/AIDS commodities

Table 1 illustrates that 39% of the visited pharmacies and 33% of laboratories had personnel trained in Logistics Management for HIV/AIDS Commodities (LMHC). While noteworthy, these percentages indicate the need for a higher proportion of trained personnel, given the critical role played by trained staff in ensuring commodity security. To address this gap, urgent capacity-building efforts are recommended, with key partners such as Management Sciences for Health (MSH), Institute of Human Virology, Nigeria (IHVN), and Family Health International (fhi360) being well-positioned to facilitate LMHC training across the six states.

Table 1
Number of sites visited; training of staff; and availability of SOPs, PCs, and internet.

Sites Visited				LMHC Training		Availability of SOPs		Availability of PC		Internet Services	
State	ART	PMTCT	TOTAL	Pharm.	Lab.	Pharm.	Lab.	Pharm.	Lab.	Pharm.	Lab.
JIGAWA	12	2	14	1 (7%)	3 (21%)	3 (21%)	2 (14%)	2 (14%)	5 (36%)	0 (0%)	0 (0%)
KANO	12	29	41	23 (55%)	14 (35%)	14 (34%)	7 (16%)	3 (8%)	1 (3%)	2 (5%)	5 (13%)
KATSINA	7	3	10	7 (70%)	7 (70%)	4 (40%)	4 (40%)	0 (0%)	0 (0%)	1 (10%)	1 (10%)
KEBBI	5	13	18	6 (33%)	1 (8%)	4 (22%)	5 (25%)	1 (6%)	0 (0%)	2 (11%)	6 (33%)
SOKOTO	0	2	2	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (50%)	0 (0%)	0 (0%)
ZAMFARA	3	16	19	13 (67%)	12 (64%)	8 (44%)	10 (53%)	4 (20%)	1 (7%)	2 (13%)	4 (20%)
TOTAL	39	65	104	41 (39%)	34 (33%)	28 (27%)	26 (25%)	8 (8%)	17 (16%)	7 (7%)	14 (13%)

4.3. Availability of LMHC standard operating procedure (SOP) manuals

At both pharmacy and laboratory units within the visited facilities, only 27% and 25%, respectively, had the national LMHC SOP manual on-site (Table 1). While all facilities with trained personnel acknowledged the possession of the manual, only the aforementioned proportions had the manual readily available within the facility during the visit. It is important to note that the SOP manuals are typically distributed during training sessions, and participants may need further guidance on the importance of keeping these documents within the facility for easy access by staff when needed.

4.4. Availability of LMIS data capturing tools

The availability of LMIS data-capturing tools within the visited healthcare facilities displayed marked improvement compared to the previous cycle. As indicated in Table 2, 50% of pharmacies and 59% of laboratories had copies of Antiretrovirals (ARVs) Daily Consumption Records (DCR) and Rapid Test Kits (RTKs) Daily Usage Records (DUR). This enhanced availability of LMIS tools signifies progress in data tracking and management.

4.5. Inventory control and security

Table 2 reveals that 51% of pharmacies and 42% of laboratories possessed Inventory Control Cards (ICC). However, these percentages suggest a relatively low level of commodity tracking within storage facilities, which can pose risks to commodity security.

4.6. Commodity reporting and ordering tools

Table 2 outlines that 56% of pharmacies and 59% of laboratories had the Commodity Requisition, Receipt, Issue, and Feedback (CRRIRF) forms for reporting and ordering commodities. It is important to note that while some facilities possessed CRRIRF forms, there were challenges related to filling out these forms effectively. Bridging the capacity gap in LMHC is essential to ensure that all healthcare providers can utilize these tools proficiently for reporting and ordering commodities.

4.7. Use of pharmacy to patient ratio (PPR) forms

Table 2 demonstrates that 72% of pharmacies possessed Pharmacy to Patient Ratio (PPR) forms. When analyzed at the state level, Katsina, Kebbi, and Jigawa exhibited higher utilization of this tool, whereas Kano and Zamfara states reported relatively lower usage. Improving the availability and utilization of PPR forms is crucial for tracking client load and appropriate drug supply.

4.8. Return and transfer forms

Table 2 indicates that only 26% of pharmacies and 14% of laboratories had Return and Transfer forms, highlighting areas for improvement in tracking commodities.

4.9. Storage space and adequacy

With respect to storage space, 33% of pharmacies and 17% of laboratories had available storage space for Antiretrovirals (ARVs) and Rapid Test Kits (RTKs), as shown in Table 3. Of the available storage facilities, 74% and 63% of pharmacies and laboratories, respectively, were considered adequately sized (Table 3). The importance of sufficient

Table 3
Availability of storage space and firefighting equipment.

State	Availability of Storage Space		Adequacy of Storage Space		Availability of Firefighting Gadgets	
	Pharm.	Lab.	Pharm.	Lab.	Pharm.	Lab.
JIGAWA	14 (100%)	7 (50%)	14 (100%)	13 (93%)	3 (21%)	5 (36%)
KANO	18 (44%)	9 (21%)	30 (73%)	28 (68%)	14 (34%)	12 (29%)
KATSINA	1 (10%)	0 (0%)	7 (67%)	9 (89%)	0 (0%)	0 (0%)
KEBBI	7 (38%)	5 (29%)	16 (88%)	14 (79%)	0 (0%)	1 (8%)
SOKOTO	0 (0%)	0 (0%)	2 (100%)	1 (50%)	0 (0%)	0 (0%)
ZAMFARA	1 (6%)	0 (0%)	4 (19%)	0 (0%)	0 (0%)	1 (7%)
TOTAL	34 (33%)	18 (17%)	77 (74%)	66 (63%)	9 (9%)	14 (13%)

Table 2
Availability of record tools.

State	Availability of Daily Record Tool		Availability of Inventory Cards		Availability of CRRIRF		PPR Forms for ART Sites
	Pharm.	Lab.	Pharm.	Lab.	Pharm.	Lab.	Pharm.
JIGAWA	12 (86%)	10 (71%)	11 (79%)	10 (71%)	12 (86%)	10 (71%)	7 (58%)
KANO	37 (90%)	28 (69%)	27 (67%)	15 (37%)	28 (69%)	28 (69%)	9 (75%)
KATSINA	2 (20%)	10 (100%)	8 (80%)	7 (70%)	10 (100%)	10 (100%)	9 (100%)
KEBBI	14 (75%)	11 (63%)	13 (71%)	11 (63%)	12 (65%)	11 (63%)	10 (100%)
SOKOTO	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
ZAMFARA	6 (31%)	10 (50%)	2 (13%)	2 (13%)	4 (20%)	10 (50%)	2 (68%)
TOTAL	52 (50%)	61 (59%)	53 (51%)	44 (42%)	58 (56%)	61 (59%)	28 (72%)

storage space in maintaining commodity shelf life is evident. Notably, the challenge of inadequate storage space in laboratories is often attributed to architectural limitations and the historic absence of dedicated storage areas for laboratory reagents.

4.10. Fire safety and technological resources

Table 3 underscores concerns regarding fire safety, with only 9% of pharmacies and 13% of laboratories equipped with firefighting gadgets. Additionally, Table 3 and Table 3 reveal limited access to Personal Computers (PCs) and Internet services, with 8% of pharmacies and 16% of laboratories having access to PCs, 7% of pharmacy units, and 13% of laboratory units having Internet connectivity.

These findings collectively emphasize areas for targeted intervention and improvement in the management and logistics of health commodities within the assessed healthcare facilities.

5. Limitations of the study

The limitations of the study include:

1. Sample Limitations: The study's findings may not be representative of the entire country or other regions due to the focus on specific states and healthcare facilities providing HIV/AIDS services.
2. Data Collection Biases: Potential reporting biases and reliance on self-reported information obtained through interviews may affect the accuracy and completeness of the data.
3. Generalizability and Scope: The study primarily targeted PEPFAR-funded ART and PMTCT sites, potentially limiting the generalizability of the findings to other types of healthcare facilities and supply chain dynamics. Additionally, the use of binary responses and the focus on specific indicators may restrict a comprehensive understanding of the supply chain.

6. Conclusion

This study provides crucial insights into the logistics and supply chain management of HIV/AIDS commodities across healthcare facilities in six northwestern states of Nigeria. The findings emphasize the need for tailored logistics strategies to meet the diverse demands of facilities dedicated to ART and PMTCT services.

While some facilities have LMHC-trained personnel, efforts are needed to enhance training and empower more healthcare staff. Availability and accessibility of LMHC SOP manuals within facilities require attention to ensure smoother logistics operations.

Improvements in LMIS data capturing tools indicate progress in data tracking, but challenges related to inventory control persist. Effective utilization of reporting and ordering tools, like CRRIRF forms, can enhance commodity management efficiency.

Addressing gaps in Return and Transfer forms is crucial for efficient commodity tracking. Varied storage space availability underscores the importance of sufficient and well-designed storage spaces.

Concerns regarding fire safety and technological resources highlight the need to address infrastructure and technology-related challenges.

In summary, this study provides a foundation for targeted interventions and collaborative efforts among stakeholders to strengthen the logistics and supply chain management of HIV/AIDS commodities in northwestern Nigeria. Key steps include enhancing training, improving manual accessibility, promoting effective inventory control, and addressing infrastructure challenges to ensure a consistent and secure supply of critical health commodities.

7. Recommendations

The following are the recommendations of this study:

1. Enhance Staff Training: Implementing organizations and partners should prioritize training personnel in Logistics Management for HIV/AIDS Commodities (LMHC) across healthcare facilities. This should include improving the availability of trained staff and ensuring that SOP manuals are kept within the facility for reference.
2. Standardize SOP Manual Management: To ensure the availability and use of Standard Operating Procedure (SOP) manuals, organizations should emphasize the importance of these manuals belonging to the facility and should discourage staff from keeping them as personal items.
3. Improve Inventory Tracking: Healthcare facilities must strengthen their inventory control systems, with a focus on tracking commodities in storage. This includes the implementation of Inventory Control Cards (ICCs) and regular audits to enhance commodity security.
4. Capacity Building for Reporting: Organizations should conduct capacity-building exercises to improve healthcare facility staff's ability to effectively use reporting tools like the Commodity Requisition and Reporting Form (CRRIRF) and the Patient Pick-Up Record (PPR) form. This will enhance reporting accuracy and the timely ordering of commodities.
5. Enhance Storage Infrastructure: Facilities should invest in storage infrastructure to ensure the safe and efficient storage of HIV/AIDS commodities. This includes creating adequate storage space, especially for laboratory reagents, and ensuring that storage facilities are designed to meet the specific needs of healthcare commodities.
6. Fire Safety Measures: Given the low presence of firefighting gadgets, facilities should prioritize the installation of firefighting equipment, such as sand buckets, to mitigate the risk of fire outbreaks.
7. Upgrade Technological Resources: Healthcare facilities should consider investing in Personal Computers (PCs) and improving access to the Internet. These technological enhancements can streamline data management and reporting processes.
8. Regular Training: Healthcare providers should receive regular training to manage the diverse range of health commodities effectively and efficiently.

These recommendations, if implemented, can contribute to the optimization of logistics and supply chain management for HIV/AIDS commodities in northwestern Nigeria, ultimately ensuring a consistent and secure supply of essential healthcare products to those in need.

Ethics approval and consent to participate

The Ethics Committee of the Federal Ministry of Health provided ethical approval (1/5–11/14) for the conduct of this study, and all participants of this study provided written consent by signing off the data collection tool after their initial verbal consent.

Consent for publication

Not applicable.

Funding

The author did not receive any funding for this study.

Authors' contributions

Kabiru Abubakar Gulma designed the study, developed the data visualization dashboard, analyzed the results, and drafted the manuscript.

Declaration of competing interest

The author hereby declares no conflict of interest.

Data availability

This study's data is primary and can only be obtained at the health facilities visited.

Acknowledgments

The author wishes to appreciate the various state governments of Nigeria, Ministries of Health, and all health facilities for providing access and the data required for this study.

References

1. Nyamongo DM, et al. The HIV/AIDS supply chain unification project: an innovative approach to build resilient and sustainable health systems in sub-Saharan Africa. *Int J Health Plann Manage*. 2017;32(2):e202–e217. https://doi.org/10.1002/hpm.2383.
2. McClure J. Fragmented and parallel supply chains: challenges in HIV/AIDS program supply management. In: Davis JM, ed. *Logistics & Supply Chain Management: Strategies for Reducing Cost and Improving Service*. Springer; 2015:149–161.
3. Gould EM, Massoumi N. Strengthening the HIV/AIDS supply chain: a unified supply chain approach. *Int J Logist Manag*. 2013;24(3):467–485. https://doi.org/10.1108/ijlm-06-2012-0071.
4.. Ibeme Anthonia. *Monitoring and Supportive Supervision Trip Report for Kano State. [Unpublished Report]*. 2014.
5.. Okafor Elvis. *Monitoring and Supportive Supervision Trip Report for Kano State. [Unpublished Report]*. 2014.
6. Mangal SS, et al. Health facility supply chain performance in Nigeria: the challenge of delivering HIV/AIDS commodities. *Int J Health Plann Manage*. 2017;32(3):e690–e706. https://doi.org/10.1002/hpm.2418.
7. Okeke N, Nwosu O. HIV/AIDS programs in Nigeria: an assessment of the funding sources. *J Global Health Rep*. 2017;1(2):34–40.
8. Mackay Shona, Olugbile Femi, Osibogun Akin. Health facility support through PEPFAR implementing partners, global fund sub-recipients, and government of Nigeria. *J Nurs Care*. 2016;5(6):5–9. https://doi.org/10.4172/2167-1168.1000285.
9. Moses J, Bolarinwa O. An evaluation of the impact of stakeholders' collaboration on supply chain management activities in Nigeria: the case of HIV/AIDS commodities. *Int J Supply Chain Manag*. 2018;7(4):662–673. https://doi.org/10.1504/IJSCM.2018.094231.
10.. Bonatson Joseph. *Monitoring and Supportive Supervision Trip Report for Kebbi State. [Unpublished Report]*. 2014.
11. Tor-Anyiin Amom. *Monitoring and Supportive Supervision Trip Report for Katsina State. [Unpublished eport]*. 2014.
12.. Gulma Kabiru. *Monitoring and Supportive Supervision Trip Report for Zamfara State. [Unpublished Report]*. 2014.