

Stakeholders' Perspectives of Healthcare Commodities Supply Chain Management Practices, Processes, and Challenges: Implications for Achieving Universal Health Coverage in Southeast Nigeria.

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Abstract

Healthcare commodities supply chain management is critical for achieving universal health coverage (UHC). In Southeast Nigeria, healthcare commodities supply chain management faces several challenges, including inadequate infrastructure, poor logistics systems, and inadequate human resources. Understanding stakeholders' perspectives of healthcare commodities supply chain management practices, processes, and challenges is essential for improving supply chain performance and achieving UHC. The objectives are to: explore stakeholders' perspectives of healthcare commodities supply chain management practices, processes, and challenges in Southeast Nigeria, identify gaps and challenges in healthcare commodities supply chain management and provide recommendations for improving healthcare commodities supply chain management practices and processes to achieve UHC in Southeast Nigeria. This study used a qualitative approach. We conducted in-depth interviews among 30 key stakeholders involved in healthcare commodities supply chain management in Southeast Nigeria. Stakeholders included healthcare supply chain managers and programme officers. We used a purposive sampling technique to select participants based on their involvement in healthcare commodities supply chain management. Data were analyzed using a thematic analysis approach. The supply chain management practices within the States is the pull system and the processes which include, selection, quantification, procurement, storage, inventory management, distribution, and logistics management information systems are done differently in the States. Several factors affect supply chain management in southeast Nigeria, and these include material, human and financial resources as well as policy issues. The study's findings will be relevant to policymakers, healthcare providers, and supply chain managers in Nigeria and other low- and middle-income countries facing similar challenges.

Keywords: Health commodity, supply chain, Nigeria

INTRODUCTION

Supply chain management (SCM) is a concept that promotes the integration of activities such as the procurement, logistics, production, and distribution of products to clients [1], and deals with the management processes of flows of goods, information, and funds among supply chain partners to satisfy consumer needs effectively and efficiently [2]. This includes the management of products, information, and financial flow from the source of supplies to the manufacture and assembly of the product right to the delivery of the final product to consumers [3]. On the other hand, healthcare product supply chain management is a set of approaches to link medicines, vaccines, equipment, laundry, food, suppliers, vendors, hospital, and transport to achieve quality service delivery through the efficient and effective use of resources. Such resources include human resources, financial resources, materials, and information to optimize customer satisfaction, improve performance, and lowers costs.

Health commodity supply chains assure the availability of high-quality drugs, vaccines, and essential medicines in the most cost-effective and timely manner to the end users [4]. This has been noted as the core of quality healthcare services if it is functioning optimally [5-6].

Globally, there is a serious problem of lack of access to many healthcare goods and services, which could be attributed to poor quality supply chain management issues in the health system. About one-third of the world's population does not have access to vital medicines [7], and almost two billion of the world's population, many of whom live in less developed nations, lack access to life-saving medicines [8]. Furthermore, in sub-Saharan Africa, 30-50% of the population lacks access to basic medical care, and many people are still suffering from preventable and treatable diseases because of inaccessibility to essential healthcare products. And in Nigeria, the low level of access to healthcare goods and services remains one of the leading causes of poor health outcomes [9].

In Nigeria, healthcare supply chain management is predominantly coordinated through the Federal Ministry of Health through the Food and Drug Services Division, Central Medical Stores, Family Health Division, and the Public Health Department. Their activities and programs are supported by local and foreign stakeholders for efficiency and sustainability through funding and local content development [10]. Since 2008, the harmonization of National Supply Chain activities in Nigeria has been a dynamic one involving the creation of an enabling environment, product selection and use, quantification, procurement, inventory control procedures, warehousing and storage, transport, distribution, logistic management information system, organizational support, finance, stakeholder/donor coordination and quality [11-12].

The provision of healthcare in Nigeria lacks a well-harmonized SCM [9]. The lack of coordination in the supply chain of medicines can lead to poor distribution, delays in delivery, and ultimately, shortages of essential drugs with serious consequences for public health, and the achievement of UHC. Therefore, efficient supply chain management is essential to ensure healthcare products are available for users at service delivery points [13].

The medicine supply chain in Nigeria has been described as chaotic and uncoordinated. Drugs are sold in open markets, on the streets, and even inside commercial passenger carriers. A

significant proportion of these medicines have been adjudged to be adulterated, fake, and substandard. About 17% of essential generic medicines and 30% of antimalarials are counterfeited. [4]. Yet, ensuring access to effective, quality, affordable, and safe essential medicines and vaccines, for all is one of the major targets of the United Nations' third Sustainable Development Goal (SDG) and is critical for the achievement of universal healthcare coverage [14].

The importance of SCM is widely acknowledged, and the problems associated with the medicine supply chain, in Nigeria, has been well noted. This ranges from ineffective infrastructure, poor quality and substandard medicines and weak policy for the implementation of SCM [5], to stock-outs of medicines and vaccines, poor supply chain practices, and insufficient human resources [4, 15].

Despite the input from the government and donor partners to improve supply chain management, the SCM system in Nigeria, remains fragile and inefficient [16]. Some studies, have been carried out in Nigeria, to identify challenges associated with the SCM systems for medicines or vaccines [17,4,18]. However, there is a dearth of literature on how SCM is practiced and the key challenges from the perspective of key stakeholders in Nigeria.

Therefore, an in-depth understanding of stakeholders' perspectives on supply chain practices and processes is important for developing effective and sustainable interventions to combat inefficiency and improve the quality of SCM in the States. This study, therefore, investigates the practices, processes, and challenges of SCM of health commodities in Southeast Nigeria from the perspectives of stakeholders involved in SCM. It is expected that findings could provide policymakers and program managers with appropriate models for designing efficient programs for managing health commodities.

METHODOLOGY

Study Area

The study took place in the five south Eastern States of Nigeria namely Abia, Anambra, Enugu, Ebonyi, and Imo. Abia state has 17 local government areas (LGA), Anambra 21, Enugu 17, Ebonyi 13, and Imo 27. These five states are geo-demographically and culturally homogenous states. Each of these states has a central medical store located at the state level for the logistic supply chain management.

Study Design

This was a descriptive cross-sectional qualitative study among key stakeholders involved in health commodity supply chain management at the state level of five southeastern states of Nigeria using in-depth interviews

Data Collection

Data collection involved in-depth interviews with key informants who are involved in supply chain activities at the State level. These respondents were purposively selected because of their expertise and extensive experience in supply chain activities. A total of 30 interviews were conducted, six from each of the five states. The respondents included the State Immunization Officer, the State Cold Chain Officer, the State Managers, the Central Medical Store, the officer in charge of the supply chain management at the State Primary Healthcare Care Agency, and

two Health Development Partners in each of the five states. The interview questions were informed by the functions of supply chain management. These key informants were interviewed separately and independently at their workplaces by arrangement in English, after issuing consent forms that detailed concerns about confidentiality, anonymity, recording, and full disclosure. Data saturation became obvious in the course of the interviews when we identified that respondents kept on repeating similar experiences at some point [19]. Each interview lasted between 45 and 60 minutes. All the interviews were audio-recorded. Notes from all interviews were edited and transcribed verbatim immediately after the interview. The transcripts indicated the designation of the interviewee, date/time, and duration of the interview only. The interviews were transcribed and coded according to the subunits of analysis following the research questions and emerging issues.

Data Analysis

Data were analysed using a framework approach. The main themes were deduced from supply chain management functions. Coding was carried out by three persons following the research questions and emerging issues and inconsistencies resolved by consensus. The codebook was generated after reviewing an initial set of 6 transcripts and was revised intermittently as the analysis progressed. We categorized the factors affecting SCM into the 3 types of essential resources for the management of programmes and projects namely human, financial, and material resources.

RESULTS

Sociodemographic Characteristics of The Respondents

In general, there were 18 males and 12 females who were interviewed and they occupied various positions in the supply chain.

Table 1 shows the coding and gender of the respondents.

	Abia	Anambra	Ebonyi	Enugu	Imo
Immunization Officer-Implementer (IP)	Male IP_01_AB_ Male	Female IP_02_AN_ Female	Male IP_03_EB_ Male	Female IP_04_EN_ Female	Male IP_05_IM_ Male
Cold Chain Officer-Implementer (IP)	Female IP_06_AB_ Female	Male IP_07_AN_ Male	Female IP_08_EB_ Female	Female IP_09_EN_ Female	Male IP_10_IM_ Male
Central Medical Stores Supplier (SUP)	Female SUP_01_AB_ Female	Male SUP_02_AN_ Male	Male SUP_03_EB_ Male	Male SUP_04_EN_ Male	Male SUP_05_IM_ Male
PHC Agency logistic Officer (LO)	Female LO_01_AB_ Female	Female LO_02_AN_ Female	Male LO_03_EB_ Male	Male LO_04_EN_ Male	Male LO_05_IM_ Male
Development Partner (DP)	Male DP_01_AB_ Male	Male DP_02_AN_ Male	Male DP_03_EB_ Male	Female DP_04_EN_ Female	Female DP_05_IM_ Female
Development Partner (DP)	Female DP_06_AB_ Female	Male DP_07_AN_ Male	Male DP_08_EB_ Male	Female DP_09_EN_ Female	Male DP_10_EN_ Male

Supply Chain Management Practices

Concerning the description of the SCM practices in all the States, all the respondents confirmed that the SCM practice within the States is the pull system. Thus, the state immunization supplies are sent directly from the national to the state through the National Primary Health Care Development Agency (NPHCDA) while the central medical stores operate an open bidding system that enables different pharmaceutical companies to supply the states with drugs that are needed as at when due. The logistic management coordinating unit (LMCU) oversees the movement of health commodities in the states and transmits information through an online platform to the federal ministry of health (FMOH). They are mainly involved with public health commodities, like HIV/AIDS programmes, Family Planning, Malaria, and Tuberculosis commodities. They also confirmed that the commodities are sent from outside the country to the FMOH. Some respondents provided relevant insights on this:

"At times the supplies are being made or pushed from the National" (SUP_04_EN_Male)

"So here we get our vaccines and other medicines from the national and national get it from the international and from other countries that produce vaccines and the maintenance begins from those foreign countries to even international airport to our national cold store to our zonal store" (IP_02_AN_Female)

"The vaccines come into the country and then are stored in the national strategic cold store. From the national strategic cold store, they are moved to the various zonal offices. We have six zonal offices in the country so we have the southeast zonal cold store here in Enugu". (SUP_04_EN_Male)

However, for commodities that the state is funding, the state solely handles the whole process from the selection down to other processes. They also use the open bidding system to choose vendors for the purchase and supply of commodities. This was noted by some of the respondents:

"If it is a state-based activity that the state is funding then the programme officer in charge of that programme based on the budget will quantify what it will take to do the work and from there the state releases fund and the commodities will be procured from the open market and we do open bidding" (SUP_04_EN_Male).

"We run a direct system..... we have a one-year fixed framework agreement for the supply of drugs and needed consumables. One-year fixed framework agreement" (IP_05_IM_Male)

Nonetheless, a respondent described their supply chain management as the pull system where the consumer determines what is supplied as noted by a respondent:

"The kind of practice we have for the supply chain is a pull system where the users of the commodities determine the number of commodities we get" (IP_01_AB_Male).

Supply Chain Management Processes

For the supply management processes, which are, selection, quantification, procurement, storage, inventory management, distribution, and logistics management information systems (LMIS), different respondents from different States explained what they do within their States.

Selection:

It was noted that for some commodities like vaccines, it is the responsibility of the FMOH to do the selection based on the need of the country without any input from the state. For example, there are already existing guidelines on the kind of drugs that can be used in programmes which then determines the selection, like drugs in the essential drug list. But, the central medical stores (CMS) select what commodities to purchase at the state level by analysing the consumption pattern of facilities, storage capacity of the health facilities, and cost implications. Some of the respondents' responses are noted below:

"Okay, when it comes to vaccines, you don't select from the state, it's the national that selects so they are the ones that carry out the certification on the vaccines that enter the country. So, from there they now push to us". (IP_08_EB_Female)

"Oh, as I said we already have ten antigens in the routine immunization, the national routine immunization schedule for Nigeria so the state is following what the national level is doing". (IP_02_AN_Female)

"Nigerian government has routine vaccines which I already mentioned so we don't have the right to select and the ones that are not partner-driven, most times they are already streamlined like for the malaria program we have the anti-malarial which you know is always from the essential medicine list basically and is determined by the consumption pattern" (LO_04_EN_Male)

"So, we have guidelines on the kind of drugs we can use in our program so, that determines selection..... of course, we have to look at the cost implication as well as availability in the essential drug list". (SUP_04_EN_Male)

"The selection is done by consideration of storage facility in the LGA and health facilities. For example, those that have solar direct drive are selected for storage of immunization Vaccines" (IP_02_AN_Female)

However, for the adjunct commodities that are bought by the state, an advert is put up for vendors to apply to supply the commodities. Some respondents noted that the selection of commodities is driven by donor partners in some cases. One interviewee explained:

"Then for this public health program how we select commodities... at times commodities are always based on what the partners support", (IP_09_EN_Female)

Quantification:

The respondents noted that annually, they conduct commodity quantification using an already formatted template adapted from the national level and this applies to both the State, Zonal, LGA, and facility delivery point levels. However, some workers are not knowledgeable in

quantification which leads to over and underestimation of health commodities. It is important to note that what is inputted into the framework depends on the peculiarity and needs of each State including the target population derived from the population census, consumption pattern of the commodities, service data, and availability of funds. This was captured thus:

"These are done either using service data, demographic or consumption data. It is done at the national level for program commodities and state level for drug revolving fund drugs, subject to availability of funding, and the quantity procured is also subject to availability of funds" (IP_09_EN_Female)

"We have certain information that is peculiar to the state that we will input, then it will sum up to whatever quantity that we will need... In that formatted template, they have the formula in place for the wastage factor, wastage rate, and all other variables so ours is to put a few states peculiar data which will then sum up the quantity that the state needs". (IP_09_EN_Female)

"They quantify which are spread quarterly, but we do forecast. We have our targets everywhere, every state has target population, driven from population census." (LO_03_EB_Male)

"for us to quantify what commodity will come to our State, first of all, we need a stock of what commodity is available in the different facilities, then we also need to look at their consumption pattern and how they utilize those commodities...but in some cases, health workers quantify wrongly". (IP_05_IM_Male)

"For immunization, quantification is based on immunization performance of the previous year... state office submits their requirement to the national after forecasting and putting into cognizance things like wastage factor, number of sessions, and target population" (DP_01_AB_Male).

Procurement:

In terms of procurement arrangements, this is dominated by the State Ministries of Health (SMOH) and this is based on the needs and consumption patterns of the health centres and General hospitals. The CMS procures through a competitive open bidding method while the immunization and public health products are not particularly purchased but given from the national level to the state level. This was noted by some of the respondents:

"We send out applications or advert for people that will want to procure this they should tender them or submit their quotations from there we pick a vendor to supply those things". (SUP_04_EN_Male)

"There is a committee that carries out the procurement of drugs when it concerns our State. It's under the ministry of Health that oversees the drug revolving fund we have a seed stock. The aim is just to make sure that there is drug supply on daily basis, yearly". (SUP_04_EN_Male)

"Our procurement is not done in abstract..... It needs the consumption patterns from those health centres and General hospitals. Before we procure drugs, we write to them, to tell us their

need. So, we buy based on the consumption pattern of the hospitals, and PHCs (LO_01_AB_Female).

"Procurement of cold chain equipment are done by partners and State government through Ministry of Health and State Primary health care development agency" (IP_02_AN_Female).

In addition to using consumption pattern for purchasing, disease pattern is also used in the States. This was elucidated by a respondent thus:

"Another thing is disease pattern. For example, in previous years, there was an outbreak of COVID-19.... so, it imbibed on us that the disease pattern and the consumption from our facilities is one of the major reasons of what to buy". (LO_04_EN_Male)

Also, the development partners play a role in purchasing as they are involved at the national level. This is often done on behalf of the country six months before the coming year. For example, for HIV commodities, the states get their drugs from the organizations responsible for the procurement which they do through a bidding process involving pharmaceutical companies that are invited to a meeting. According to some of the respondents:

"However, for the procurement of cold chain equipment, this is done by partners and State government through Ministry of Health and State Primary health care development agency.....so, we are not, directly involved in procurement we just request, and we get. There is a different organization responsible for all that and they do competitive bidding" (IP_02_AN_Female).

"They invite different vendors and they consider different things including the pricing, the best vendor may be depending on the price, the quality and the kind of services and all other factors, they choose the best vendor after the selection of vendor, they send a purchase order to the vendor, the vendor procures or supplies the drugs as they have requested" (IP_09_EN_Female)

"They do a bidding process where pharmaceutical companies are invited to a meeting where each pharmaceutical company looks at what the state wants and what they can purchase at a particular price. So, when they've agreed with that price, and what quantity each of the companies will supply they can go ahead" (DP_04_EN_Female).

Storage:

All the different states have their storage facilities at different levels of the health system. There are central medical stores at the State level where drugs and other commodities are stored in their storage facilities with an emphasis on following standard storage guidelines. For example, there are cold rooms and cold stores both for the freezable and non-Freezable vaccines, syringes and needles, and family planning commodities as well as other forms of storage facilities that are for commodities that do not require storage in the cold chain system with proper lighting conditions and on pallets. For programme commodities (HIV/AIDS, Malaria, and Tuberculosis), these are stored centrally in one of the five states as the zonal store from where the other states are serviced, while for other medicines, the CMS takes care of the storage. In addition, some LGAs and facilities have storage facilities. Some respondents responded thus:

"We have the freezable those that are in refrigerators, Like yellow fever, OPV. When they come down to us, it is in a freezable condition but when it is going down to the next level, from state to local government all of them are at +2 to +80C and it can be managed like that..... we have a cold room, we have walk-in cold room and walk-in freezer room" (IP_02_AN_Female).

"There is diverse supply chain storage equipment selected for storing each product available for use. Ice lined refrigerator, chest freezers, walk-in freezer room, cold boxes and ultracold chain for Pfizer COVID-19 vaccine" (IP_06_AB_Female)

"Here we have 3 stores, we have shelves, we have pallets that you give small gap so that the cartons do not touch the wall..... okay for those commodities that come to the state, we have the central medical store where... we have two, one is like a cold chain and the other is basically for all manner of drugs" (SUP_04_EN_Male).

"Some of the local governments and facilities have their own depending on the capacity, what you can house in your store, that is what you now request for. But for us here in the state, eh ... the central medical store we use is the central medical store". (IP_09_EN_Female)

"Even if we retrieve some drugs from the facility, maybe we are trying to ensure commodity security where you think you might not consume the drugs before the expiry date... we retrieve them into our office and from the office, we redistribute them to the facilities that we know that can consume them so we have storage spaces for all that, for that purpose". (LO_01_AB_Female)

Inventory Management:

As part of the inventory plan, some of the States have an inventory replacement plan that is updated every quarter of the year by the cold chain officer in some states assisted by the UNICEF Vaccine Security Logistics Officer (VSL) in the State especially when new products are added. However, a review of existing inventory is usually done monthly at the state's central medical stores. These replacement plans have information on the manufacturers, the serial numbers of equipment, etc.

"There is an inventory template provided by the national body which can be updated periodically when new product(s) are added or when there is a breakdown or a mitigation process is being carried out" (IP_06_AB_Female)

Also, the LMCU uses inventory control card forms to manage inventory. Thus, this enables them to know what they have in their store at every point in time. The immunization programme has a store manager that controls the movement of commodities and they take stock every week. In addition, for vaccines, they have in soft copies the actual vaccines that are delivered in the LGAs and health facility level including their batch numbers and the expiration dates which enables them to track the number of vaccines remaining and the expiry dates. Some States employ the first expiry first out (FEFO) principle to ensure drugs do not expire in the stores. They also conduct monthly physical counts and visual inspections. These were aptly captured by some respondents

"The inventory management is done every 3 months to check the outdated and also update the equipment in case there is supply...and we use FEFO principle as well as doing of monthly Physical count and Visual inspection" (SUP_02_AN_Male)

"We have a tool we use; we call it the inventory replacement plan. it's like an excel sheet that just has the numbers of the various cold chain equipment that are available at the various health facilities per LGA and we look at it quarterly. So, the health facility, the local government cold chain officers are normally supposed to update the plan every quarter so they should find out from the health facility if they are working or not" (IP_04_EN_Female).

"When a vaccine is about to expire, we look at the quantity and also estimation of utilization rate in that area and know whether they will be able to consume it or not and we will know whether the state as a whole will be able to finish the vaccines.... If we will not be able to finish it looking at our consumption rate, we can now inform the national level that this vaccine is expiring by this time and that it is better we send it back to them to look out for other states that will consume them before expiration" (LO_04_EN_Male)

"We use vaccine Stock Management Tool (SMT). It is used to record day-to-day operations at vaccine stores, facilitating stock visibility across levels and providing an effective way to monitor supplies and cold chain equipment. Manual inventory is still done. Every week data is submitted by the LGA which will show the stock balance, equipment whether they are functional or not, and whether there were repairs or maintenance. Every month, State submits inventory (stock balance) to the country office" (DP_06_AB_Female).

It was also stated that for accountability, inventory records are maintained at the CMS for all health commodities in hard and soft copies and all received, issued and stocks are recorded and signed. This was noted by a respondent thus:

"For auditing, we keep proper records including all we issued out and what we received" (IP_10_IM_Male).

Distribution:

The LMCU distributes commodities to different states and facilities through third-party logistics. These are just truck drivers that do the delivery. For the immunization commodities and the CMS, individuals from different LGAs come and pick up drugs while the state immunization office sometimes delivers vaccines to different facilities. In addition, in some States, the facility officers go directly to the CMS for their commodities.

"Most of the time, health facility officers or LGA officers come to the State Central Medical Store to collect their medicines especially after waiting for the State to deliver them and they are not forthcoming" (DP_01_AB_Male).

Also, in some states, the push and pull system is used at the same time, and health commodity distribution is based on different factors, and as noted by a respondent, these factors include:

"The target population of the group, the total population of the area, the number of Wards in an LGA, and the number of commodities in stock" (IP_07_AN_Male)

In distributing the commodities, the SCM managers are mindful of the fact that all the States and LGAs set up a minimum and maximum stock level for their commodities. They believe that the minimum stock level of a period is high enough to cover the demands in the following periods within the minimum days' supply and that the maximum stock level of a period is large enough to cover the demands in the following periods within the maximum days' supply within a locality. As noted by a respondent:

"Okay for vaccine we have minimum stock level and maximum stock level we have even reorder level. So, the minimum is the minimum you will have within your locality. The maximum is the maximum you will have within your locality then the reorder level is at this reorder level you have to, when you look at what you have, then you have to request so that you will not get out-of-stock..... So, when a local government staff comes, we have to check their minimum stock. They have to send to us even ahead of time that this is our minimum and maximum stock so that we know what we can give them" (IP_04_EN_Female)

In some cases, the LGAs use health workers to collect commodities at the State level and only use the push system when there is an outbreak in which case, the States will directly go to the LGAs to supply the commodities. This was captured by some of the respondents thus:

"Yes, at times they use their, health workers at the LGAs to collect the medicines.... they can just come on their own and collect" (SUP_02_AN_Male)

"We use both push and pull systems... however, we only use the push system when there is an outbreak". (IP_10_IM_Male)

However, during the COVID-19 period, the distribution of commodities from one state to another was a challenge because of the lockdown. The CMS operated a push system for the distribution of commodities provided for the outbreak using a third-party logistics company, while there were phased deliveries for the vaccines during the peak of the pandemic. A redistribution method was also adopted to meet the needs of lacking facilities during that period because of the lockdown and the delayed supply of commodities that plagued that period. Some of the respondents captured it thus:

"You might see facilities that have very high commodities that they might not exactly exhaust before the next supply or before expiring, so most times we do a kind of redistribution so that at least everybody will still have what they are using until the next supply comes" (SUP_04_EN_Male)

"The agency came up with strategies to ensure that some of the farthest parts of the state got vaccines they were pushing to a central LGA ... so that they don't have to come down this far to the state" (LO_04_EN_Male)

For the HIV commodities, the different implementation partners gave drugs to patients irrespective of the implementation partners responsible for the drugs at the time because of the lockdown. This was to prevent patients from crisscrossing other states to get their drug refills. Also, to reduce patient-hospital contact time, the drug refill time was reviewed upwards from three months to six months for patients who were relatively stable and compliant with

medications. In addition to the six months refill, the community health system was used. Here, the drugs were taken to the community for the patients. However, for the COVID-19 vaccines, there is a third-party logistics company that is handling distribution for all the States. And for other programmes, different methods are used which are informed by data on the ground to determine the quantities for distribution as noted by some respondents.

"I told you for our COVID-19 vaccines there is a third-party logistics company that is handling distribution. They are responsible for distributing those COVID-19 vaccines from the state to the LGAs" (SUP_04_EN_Male)

"The partners always employ third-party Logistics officers. They are just truck drivers that distribute those commodities to different facilities alright" (LO_03_EB_Male)

"For the HIV/AIDS programme, we distribute commodities using a method we call Last Mile Distribution". (DP_09_EN_Female)

"We don't just come and say, you take this or you take that. We need data, data on the ground to determine quantities to distribute to various facilities or various service delivery points" (IP_06_AB_Female)

Logistic Management Information System (LMIS):

According to all respondents, the logistic management information system is for the management of the distribution of vaccines from Zonal and State cold stores and LGA. It is also used in the quantification processes to avoid overstocks and stock-outs. It is also an online platform that the LMCU uses to transmit information directly to the federal ministry of health, while the immunization office and CMS operate a manual form of logistic information management. The consumption data of different programs are keyed into this platform. Also, the logistic report from different public health programs is validated and keyed into the platform. There is also a decision-making tool that is used to determine if the facility is going to get a refill of a particular commodity or not and in what quantity. This was noted by some of the respondents:

"This is done to manage the distribution of vaccine from Zonal and State cold store and LGA. Currently we are using open LMIS that enable the cold chain officers to order and re-order using a device" (DP_04_EN_Female).

"There is a tool we call CRRF which we use to send report every 2 months..... it is a decision-making tool and it captures every inventory activity that occurred in that context, within those two months reporting periods and gives us an idea of which drugs to supply and in what quantity" (SUP_04_EN_Male)

"That platform is an online based platform, where we collate logistic report from different public health programs validate those reports and key it in into an online platform" (DP_01_AB_Male)

"We use Ledger and Stock cards but in addition, public health programs like HIV, TBL, Family Planning and Malaria also use Nigeria Health Logistics Management Information System database, and information is keyed in on a bi-monthly basis" (SUP_03_EB_Male)

Factors Affecting Supply Chain Management

Several factors affect supply chain management in southeast Nigeria, and these include material, human, and financial resource issues as well as policy issues

Material Resource Challenges:

This encompasses poor quantification of health commodities, shortage of commodities and in particular, the emergency stock-out of vaccines, access to commodities, inadequate cold chain equipment at State and LGA levels; non-functional vehicles for vaccine distribution to LGAs; poor electricity supply to the store; poor storage of commodities; limited availability of LMIS reporting tools and poor reporting, poor data and the push system policy.

1. Poor Quantification of Health Commodities

According to several respondents, health workers lack the technical capacity to quantify the needed commodities both at the LGA and facility levels. This was aptly captured by a respondent:

"Several health workers, lack the information, equipment, and capacities needed to accurately quantify how much health commodity they need to procure, and even when it has to be in the facility (SUP_04_EN_Male)

2. Shortage of Commodities/Emergency Stock Out of Vaccines and Access to Commodities

Shortage of and access to commodities are some of the challenges of supply chain management as most times the LGAs and States lack medicines and cold chain facilities to issue to facilities. Some facilities also do not have access to commodities because they are hard-to-reach areas. The vaccine stock-outs, usually contribute to failure in adhering to set service schedules, postponement or cancellation of outreach activities, inability to provide services when mothers came to the centre, etc. According to those interviewed, mothers have lost trust in the health services and it has been difficult to convince them to come back when they had been let down at times. This at times leads to missed opportunities for immunization. This was reported by some respondents:

"Severally, we have run short of vaccines and other drugs in both the state and LGA making it difficult to offer services". (IP_04_EN_Female)

"If a local government is out of stock of any vaccine and there are no means of coming to collect, then they will stay, and even those that come for vaccination will not vaccinate and this will lead to missed opportunities, in a case of a client who is due for immunization comes to receive that vaccine and there is no vaccine.....the person might go and will not come back again". (IP_09_EN_Female)

"Even if facilities request for drugs, giving that to them will depend on the availability in the central warehouse and decisions are made based on what is available on the ground and these

are usually not enough... These challenges faced have their consequences on the supply chain management". (LO_04_EN_Male)

"Getting the commodities to the "last mile" i.e to the doorstep, the hospital, where the patient can go and get their drugs, can be challenging as the terrains might be bad and there are security challenges... so these kinds of factors affect the system" (IP_02_AN_Female)

It is important to note that during the COVID-19 lockdown, the SCM was a big challenge. However, there was an agreement, and vaccine and commodity distribution were handed over to the development partners that do distribution to enable those safeguarding the border to allow them to pass through to other States with public health commodities so that each state will equally receive their commodities. Health workers were reluctant to move around because of both the lockdown and the fear of contracting the disease. Although all the States benefited from the ultra-cold chain facilities because of the temperatures the vaccines were stored in, some programmes had to re-adjust. This was noted by some respondents:

"In fact, that was the period that formed the upgrade from the 3 monthly refills to the 6 monthly refills for HIV drugs and what we did was to try and reduce patient contact with the hospital" (DP_02_AN_Male)

"We used the community system, whereby drugs were taken to the community for the HIV patient.....we also had a system where we had patients coming from other states to collect their drugs, so they call the facilities, and the facilities, in turn, called us to ask what to be done....there was also inter state redistribution of drugs and exchange of patients' treatment and reconciliations of data later through the implementation partners in various states." (DP_07_AN_Male)

3. Transportation Requirements

It was noted that the lack of vehicles to transport medicines and vaccines was a key factor affecting SCM in some states. This included non-functional and no vehicles for vaccine distribution to the LGAs and facilities. Although, a third-party logistic system is used sometimes for some products, one of the health workers noted that:

"Government vehicles were usually not available especially when the third-party logistic vehicle is not available and we have to hire vehicles with our own money.....in most cases these monies are never reimbursed". (IP_09_EN_Female)

4. Lack Of Storage Space and Poor Electricity Supply

Lack of storage space and poor electricity supply to the store was noted as a challenge as some of the LGAs and health facilities lack the space to store their vaccines. Even when there was space, the electricity supply is usually a problem, except where there is a solar energy system. This was captured by a respondent thus:

"And you see that as we are working now, our stores are too small ... we need to expand it..... yes, we need more storage space and some storage gadgets"(IP_06_AB_Female)

5. Inadequate Cold Chain Equipment at The State and LGA Level and Cold Chain Maintenance of Vaccines.

One of the key problems in vaccine management is the maintenance, efficient and effective monitoring of the cold chain of vaccines from the State level to the LGA, and to the facilities. One respondent put it thus:

"At times we lack appropriate temperature recording and monitoring system, especially in the facilities where they are consumed..... and if not properly monitored, the vaccine vial monitor could change without your knowing about it... and you know this shows the vaccines are getting spoilt" (IP_01_AB_Male).

6. Poor Maintenance Culture

Poor maintenance of existing equipment is another problem highlighted by one of our respondents. There is several obsolete cold chain equipment that has exceeded their life span. Several faulty pieces of types of equipment range from small faults to big faults. And because this equipment was donated by donor partners, the government is waiting for them to come and repair them, when they could easily do so themselves. These were noted by some respondents:

"If you go to some of the health facilities you will see a lot obsolete cold chain equipment.... some of them have been there for years" (LO_02_AN_Female)

"They also have a lot of equipment that is faulty ... some of them something as small as a battery or maybe a solar refrigerator and everybody just folds their hands and nobody wants to bring out money to repair and it is the LGA that ought to be responsible but you know you don't see them doing anything... something as small a battery but they are still waiting for that same funder or donor to come and give them new battery" (DP_04_EN_Female)

7. Poor Quality Reporting, Limited Availability of LMIS Reporting Tools Poor Data.

The respondents noted that there is poor quality reporting and poor SCM data in all the States. They noted that with poor data it is difficult to make informed decisions on matters of SCM. As noted by some respondents:

"Access to supply chain data is key to the efficient management of supply chains but we don't have the necessary LMIS reporting tools" (IP_10_IM_Male).

"How can we check inventory levels and inventory replenishment requirements without good data"? (SUP_02_AN_Male a)

Human Resource Challenges:

Human resource factors include inadequate personnel, health worker and patient insecurity, staff attrition, uneven distribution of staff, and capacity constraints. As noted by several respondents, lack of manpower, attrition of staff, and uneven distribution of staff are key challenges encountered in SCM practices. As a result, some health workers are overworked and some are stressed out. According to a respondent, this was more evident during the COVID-19 pandemic when health workers were scared of performing their SCM functions. This was noted by some respondents:

"The insecurity in Nigeria has impeded both the availability of health workers in their duty posts and transportation of health commodities" (LO_04_EN_Male)

"The attrition of staff is a big problem..... since I came into the system I have seen where so many people retiring and I have not seen any advert for new employment so sometimes you get into a facility and there is only one government worker there. The second person there is a volunteer" (IP_04_EN_Female)

"Even when you have a lot of people they are concentrated in the urban areas and you can't say or see what they do in urban areas and then you have health facilities... there is practically nobody there running the place and then you want vaccines to reach the mother and child" (DP_04_EN_Female)

"I had to go to one of these facilities for supervision, they were like hundred women with their infants waiting to collect vaccination and it was only one woman that was vaccinating... how possible is it so these are things you know issues that we have". (DP_06_AB_Female)

"You can go to a health centre and only one person is in charge of the health centre, the same person is in charge of immunization, antenatal, delivery, and even all the treatment in the facility.". (DP_01_AB_Male)

"We do this temperature monitoring where a health worker is supposed to monitor in the morning and monitor in the evening as she leaves the office and it's supposed to be done everyday, public holidays inclusive, and then you have one person working in a facility... how possible is it?" (IP_09_EN_Female)

However, a more complex constraint related to human resources was health workers' attrition. Respondents noted that they do not have enough hands in the facilities, at times occasioned by staff attrition. This was noted by one of the respondents:

"We don't have enough staff to carry out our activities. Most of the health workers when transferred to rural areas, stay for a very short time, soon they all leave and vanish to other urban LGAs". (LO_01_AB_Female)

Some respondents also noted that it was not just the absolute shortage of staff that affected the performance of SCM, but in addition to the shortage of staff at the facility levels, those interviewed indicated health worker absenteeism as a key issue. As a result, the remaining staff was frequently charged with double and competing duties. It also affected the outreach health services like immunization and nutrition services.

"We are short of staff and most of those we have don't come to work regularly. There is even a health facility where only one person is in charge of the health centre, the same person is in charge of immunization, antenatal, delivery, and even all the treatment in the facility.". (LO_04_EN_Male)

Lack of capacity was also mentioned as a key challenge even if there are health workers. This is so because it's not every facility officer that knows how pharmaceuticals or health commodities

are meant to be stored or how it's meant to be reported on, and how they utilize them. This was noted by a respondent.

"Some of them also do not know the storage requirements of some of the vaccines.....those that have to be in some certain temperature". (DP_01_AB_Male)

Financial Resource Challenges:

The lack of funds was noted as a key challenge. This includes poor funding for the distribution of vaccines and other commodities to the LGAs, and funds to visit hard-to-reach communities. The lack of funds was said to have affected performance in several ways including frequent and prolonged vaccine stock-outs, shortfall of resources, and transportation for covering hard-to-reach populations. Some respondents also noted that the current inflation in Nigeria and the lack of financial motivation for health workers that will need to work outside their working hours and schedules are key challenges to funding SCM. This was aptly captured by some respondents:

"At the LGAs they may run short of vaccines but because they are not funded, they may not come to the state to collect vaccine... so there is no budget line at the LGA level, for the distribution of vaccine and collection of vaccines and other commodities from the state" (IP_03_EB_Male)

"so you find situations where a particular LGA may be out of stock for a vaccine not because the vaccine is not available at the state but the person will be like, nobody gave me money to come and collect vaccine....also other challenges are the paucity of funds to always do those visits to facilities because for us to visit all these far-to-reach local governments we need funds" (IP_04_EN_Female)

"The major factor in Nigeria today is inflation and the rate of dollar to Naira is very high and affects almost everything that has to do with money" (IP_07_AN_Male)

Non-Adherence to SCM Policies and Guidelines:

In terms of SCM policies and guidelines, it was noted that several of them exist. For example, the push system policy of the government was mentioned by a few as one of the challenges of SCM. The respondents opined that this is not strictly adhered to as the reverse is what is happening in some cases. Some respondents also noted that they are not aware of some of the policies guiding SCM in the country. This was noted by some of the respondents.

"So, one major problem is the fact that we are still basically operating the pull system where the LGAs come and collect from the state, health facilities come and collect from the LGAs" (SUP_02_AN_Male)

"There are certain factors; the national guideline says that vaccines should be pushed. The push system means that the federal will push to the zone, the zone push to the state, the state push to the local government then, the local government pushes to the facilities but the reverse is the case. At times the national will push, national are pushing but states are not pushing." (SUP_04_EN_Male)

At the national level, there are several policy documents to guide supply chain management. However, these have neither been adopted nor adapted. These policy guidelines include the Nigeria National Pharmacovigilance Policy and Implementation Framework, the National Product Supply Chain Management Strategy and Implementation Plan (2021-2025), The National Health Product Supply Chain Management Strategy and Implementation Plan (2021-2025), Nigeria Drug Policy, Nigeria Vaccines Policy, Nigeria Supply Chain Policy for Pharmaceutical and other Healthcare Products 2016, Supply Chain Communication and Coordination Framework for Public Health Programs in Secondary and Tertiary Health Facilities in Nigeria (Sept. 2017), Supply Chain Communication and Coordination Framework for Public Health Programs at the Local Government Areas in Nigeria (April. 2017), standard operating policies (SOP) including SOPs for maintenance of vaccines, transportation of vaccines, storage of vaccines, maintenance of ledger, assessment of warehouse used for storage of pharmaceuticals, Drug Revolving Fund guideline, National pharmacovigilance policy, and implementation framework.

It was noted that although these documents are very important for the practice of SCM, health workers, and programme managers are unaware of them and therefore hardly use or apply them and should be harmonized. A respondent noted:

"It is important "these guidelines and policies are properly disseminated so that health workers can understand them and there should be a policy coordination framework bringing all the documents together" (SUP_04_EN_Male)

At the state level, some states have developed policy documents to guide SCM e.g. in Anambra State, there is the Anambra State Drug Logistics Policy 2010 which supports the establishment of the Drug Revolving Fund Scheme in the state. It also contains the State Essential Medicines List. However, as noted by a respondent:

"This is long overdue for review because a lot of other things have happened in supply chain space since 2010" (SUP_02_AN_Male).

In general, respondents noted that they need to be more proactive in improving SCM. Since there is a platform in which they upload their reports directly that makes information visible even at the national level, they can pull out those reports on a sheet where they can analyse it and see a series of events and decisions that can be made. One can also see a lot of threats to the logistic system from this report like those that are almost going out of stock.

Strategies for Addressing the Factors Affecting SCM

Several strategies were recommended for addressing the factors affecting SCM. This includes redistribution (for addressing vaccine shortage), addressing lack of funds, the pull system, maintenance culture, staff attrition, lack of capacity, access, availability, and government policy. All these were captured by some respondents:

In terms of redistribution strategy, the respondents opined that:

"If we run short of vaccine, they can look at other states nearby and look at their quantity, what they have. They may direct them or even send some people to get from the neighbouring states and push to us" (IP_01_AB_Male)

"If there is an emergency stock out at the state generally, we notify the national that we have stock out. They may send directly from the national or they may look around the states around us they will be given one or two directives on what to do if there is any state that has what we need" (SUP_04_EN_Male)

In addressing the pull system, it was noted that at times, the state supports the pushing of the commodities, and during campaigns, partners normally make provision for the distribution and collection of the vaccines. The LMSU largely depends on partners to help solve its funding problems. In addressing the fund and human resource issues advocacy to local government chairmen and State commissioners is necessary to employ and engage more health workers, and to release funds for immunization activities since they have a budget, but releasing the fund is a problem. Also, advocacy to the donor partners at the state is important to provide funds for training, vehicles for commodity distribution, and supportive supervision.

For capacity building, it was stressed that the LMSU should largely leverage existing platforms or meeting to build the capacity of health workers in supply chain management. It was also stressed that training and re-training, mentoring, and supportive supervision are key and should be strengthened. This was stated by some respondents:

"It's when we now visit those facilities, we can give that mentoring. The partners too also offer some mentoring on logistic management and other things required there". (IP_07_AN_Male)

"Training on logistic management of public health commodities, we do that, training on reporting, training on how to even store these commodities in facilities....we do that anytime we visit facilities and because in some local governments, focal persons are transferred from one facility to another, some facilities will have someone that is not trained. So the person might not know how to store those commodities or fill those inventory control cards or even the reporting forms so those are part of what we do". (DP_03_EB_Male)

"it's just that we train. Different training, either on-the-job training or when we have the opportunity of inviting them for you know a broader training they are invited to be mentored on some certain things, supply chain management, inventory management and you know what have you and even introduction of new drugs, we also invite health care professionals you know to mentor them on those drugs and what's the advantage over what we have been using initially". (IP_06_AB_Female)

"Some donors have interactions with these health workers.....cold chain officers where supply and logistic issues are discussed you know where we try and train them, untrain them and retrain them you know eh because things keep on changing". (DP_04_EN_Female)

DISCUSSIONS

This study investigates the practices, processes, and challenges of SCM of health commodities in Southeast Nigeria from the perspectives of stakeholders involved in SCM. Our key findings show the different practices and processes of SCM in all the States. The key areas of SCM processes, which are, selection, quantification, procurement, storage, inventory management,

distribution, and logistics management information systems (LMIS), are in place in all the states. However, these are operating at different levels in the various States.

Supply Chain Processes

The selection of essential drugs is very important and is considered a crucial step in ensuring access to essential drugs and in promoting rational drug use. All the States studied adopted the essential medicine list of the Federal Ministry of Health. Establishing and using an established essential medicines list is a cost-effective way of providing regular supply and rational use of medicines and this has been linked to strong healthcare systems which are necessary for achieving universal health coverage. WHO has defined essential drugs as "those that satisfy the needs of the majority of the population and therefore should be available at all times, in adequate amounts in appropriate dosage forms and at prices that an individual and the community can afford" [20]. Studies of the economic effect of essential medicines lists demonstrate that considerable savings can be achieved, through careful choices for high-volume items that consume the major share of the essential medicine budget [21].

Quantification is a key function in health commodity SCM. Yet in this study, it was noted that the health workers lacked the information to input and capacities needed to accurately estimate the quantities of specific health commodities needed during a specific period in some of the states. This same problem has been noted in UNICEF's call to improve access to and use of quality medicines to save the lives of newborns and children [22], and this has budgetary implications since they can over or under-quantify. Accurate quantification requires information from various sources. These include essential medicine lists, consumption data, epidemiological (morbidity) data, prescription patterns, minimum and maximum stock levels, frequency of stock-outs, and length of the procurement cycle [23].

The procurement process is expected to provide the right medicines to be prescribed in the appropriate formulation for administration. In this study, procurement is done at both the federal and State levels. However, centralized procurement and decentralized distribution have been found to improve access to medicines in some settings [24]. A good procurement process will have an impact on patients' outcomes by having high-quality medicines available in the right place and at the right time.

All the different states have their storage facilities including power supply at different levels of the health system. There are the central medical stores at the State level where drugs and other commodities are stored in their storage facilities with an emphasis on following standard storage guidelines and those at the LGA level. However, in some states, these are inadequate and likely to lead to poor quality and efficacy of medicines and vaccines which are offered to the end-users. This has been noted in Ethiopia where inadequate storage facilities and the inability to maintain appropriate cold chain temperature was a key challenge for the country [25-26]. An effective and dedicated storage space provides the correct environment for the storage of medicines and commodities and assists the efficient flow of supplies.

In all the States, inventory management seemed to be optimal as there is an inventory replacement plan and stock management tools in place to guide their activities. This will enable the States to reduce risks relating to patient safety, and ensure the availability of drugs without frequent stock outs as has been noted in another study [27]. It will also eliminate wastage [27],

and reduce adverse patient outcomes [28]. However, these positive findings on inventory management contrast with what was found in South Africa where poor inventory control systems were identified as part of the issues contributing to lack of medicines in the country [29].

The primary goal of health commodity distribution is to maintain a steady supply of supplies to facilities where they are needed, and ensure that resources are being utilized effectively. In this study, the states mainly use a third-party logistic system with dedicated transportation facilities. This ensured the timely distribution of quality medicines and vaccines at the LGAs and health facilities, especially during the COVID-19 pandemic. In all the States, distribution models tend to be mainly the push system, although on rare occasions the pull system is employed especially during disease outbreaks, and is triggered by order requests received from the facilities and the LGAs. This efficient distribution using a third-party logistic system contrast with findings in another Nigerian study where it was discovered that frequent breakdown of vehicles combined with poor road network system added to the delay in the distribution of medicines [16], and also a study in Malawi where a major challenge was delayed deliveries and maintenance of uninterrupted supplies of antiretroviral drugs [30].

A combination of an online and manual form of logistic management information system is in use in these States. The online platform is likely to ensure the accuracy and timeliness of information which is important for a well-performing supply chain system. However, this cannot be said of the manual method as respondents noted that there is limited availability of LMIS reporting tools and this can affect reporting leading to poor SCM data in all the States. Without good-quality data, it is difficult to make informed decisions on matters of SCM. It has been noted that providing reliable and timely information about the movement of goods within an organisation is particularly important in healthcare, where it is important to control medical department requests and monitor individual patient consumption [31]. Therefore, improving the timeliness and accuracy of data collected at all levels of the health supply chain through electronic logistics management information systems will enable programme managers to plan ahead

Factors Affecting Supply Chain Management

Several factors were said to affect supply chain management and these included material, human, and financial resource issues as well as policy issues.

Material Resource Challenge:

For Material resource issues, they included poor quantification of health commodities, shortage of commodities and in particular, the emergency stock out of vaccines, access to commodities, inadequate cold chain equipment at State and LGA levels; non-functional vehicles for vaccine distribution to LGAs; poor electricity supply to the store; poor storage of commodities; limited availability of LMIS reporting tools, poor reporting, poor data, and the push system policy. Most of these issues concern the maintenance of the cold chain system and have raised questions regarding the uninterrupted availability of quality healthcare commodities and the degree of safety and protection received by the end users. These issues have been noted in some studies where the authors noted that appropriate cold chain management is the foundation of the safety and quality of vaccines [32-34]. Other studies have also noted these healthcare commodity transportation and distribution challenges in certain health programmes including

malaria and tuberculosis [35-38]. When supply chain temperature control is poor, products like medicines and vaccines are more likely to break or wear out before their warranty period expires.

It is important to note that the SCM was not disrupted during the emergence of the COVID-19 pandemic in some states. This was a result of an innovative means of transporting health commodities through a third party during the shutdown. This ensured that both vaccines and essential medicines reached the end users. States and other countries may want to adopt this measure during epidemics or crises.

All in all, the immunization Agenda 2030 (IA2030) have recommended the need to "Strengthen supply chains to ensure that high-quality vaccines (and medicines) are always available in the right quantity and form at the right time, in the right place and stored and distributed under the right conditions" [39]

Human Resource Challenges:

The human resource challenges noted in this study included inadequate personnel, health worker and patient insecurity, staff attrition, uneven distribution of staff, capacity constraints, and poor motivation of healthcare workers. These issues affect health worker productivity and performance, especially at service delivery points. In a study in Nigeria, inadequate human resources, medicines and vaccines were reported as the main issues at service delivery points [40].

The health professionals in Nigeria are yet to be adequately remunerated like their counterparts in other advanced countries of the world. The consequential effects of poor motivation include frustration, poor service delivery, psychological warfare at work, industrial strikes, and brain drain. Therefore, successful SCM implementation requires effective management of related human resources issues. To enhance human resource capability, the states need to invest in talent development through continuous training programmes on SCM that are certified by professional bodies. This has been noted elsewhere [41].

One key issue that is affecting SCM noted in this study, is the issues of security of health workers, health facilities, and healthcare commodities. In some cases, health workers have been attacked by armed robbers and the theft of healthcare commodities including cold chain equipment. These security challenges constrain SCM including access and provision of services at the facilities for achieving universal health care coverage. This has been noted by several authors both in Nigeria and outside Nigeria where security challenges across the health facilities have been recorded [42-45], and this precipitates the unavailability of health services with dire consequences for the achievement of UHC which is considered a strategic component of the SDGs for goal 3 that seeks to ensure all individuals and communities have equal access to key health interventions.

Financial Resource Challenges:

One of the key challenges of SCM noted in this study is financial resource issues. Funds must be allocated for SCM activities. There are several perceived cost drivers for SCM in this study including infrastructure, human resources, storage management costs, transport costs, etc.

Despite the importance of SCM the government of the various States does not allocate sufficient funds for the SCM, rather they prefer to wait for the donor partners to do so for them.

Several studies in Nigeria have also noted this phenomenon of poor funding, for health commodity SCM [46-47, 36]. These financial challenges are also similar to that reported in Uganda [48]. Significant funding by the states is therefore needed to alleviate the financing gaps. States should pay their counterpart funds to supplement what the donor partners are spending and for the sustainability of SCM.

Policy Issues:

In terms of SCM policies and guidelines, it was noted that several of them exist. However, these policies are not adhered to as some of the health workers are not even aware of some of the policies guiding SCM in the country. In Nigeria, the non-implementation of relevant policies, programs, and agreements between the government and the various healthcare workers has frequently led to a refusal to provide healthcare services to the sick [49]. A study in Nigeria also highlighted the challenges of weak implementation of relevant policies on the quality and distribution of medicines in the country [5]. The non-adherence and poor implementation of relevant policies on medicines and vaccine supply have also been reported in India [50]. There is therefore a need to strengthen the implementation of the various SCM policies highlighted in this study.

Study Limitations

A non-probability method was used in this study to select a few participants and their views, in each state. This may not reflect the true representative views of other stakeholders in SCM. However, the results provide a platform for larger quantitative studies

CONCLUSIONS

A successful SCM of healthcare commodities is predicated on an effective system that enables proper selection, quantification, procurement, and storage with appropriate temperature control in the cold chain, adequate inventory management, distribution, and LMIS that will ensure the promotion of a robust, resilient and efficient SCM performance. The States are operating at different levels of SCM, and a riddled with several challenges and shortcomings including infrastructural, material, human, and financial resources which hinder effective healthcare delivery services. Adequate human resources, sustainable financing, and robust LMIS are key to ensuring the uninterrupted availability and accessibility of healthcare commodities. These challenges are likely to impede the access to quality essential medicines thereby weakening efforts intended to meet one of the major targets of SDGs in Nigeria which include access to safe, quality affordable and effective essential medicines and vaccines, for all

RECOMMENDATIONS

The several strategies recommended by the stakeholders should form the pivot of improvement in SCM in these states and includes redistribution (for addressing vaccine shortage), addressing lack of funds, the pull system, maintenance culture, staff attrition, lack of capacity, access, availability, and government policy. This should be the hallmark of SCM.

OTHER INFORMATION

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Ethical Considerations

Ethical approval for this study was obtained from the Ethical Review Committee of the University of Nigeria College of Medicine. The purpose of the study was explained to all the participants and informed consent to voluntarily participate in the study and audiotape of the conversations were obtained before the interviews were conducted. The participants were assured of the confidentiality of the data. In addition, the recorded interviews were kept in a safe steel cabinet only accessible to the researchers.

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