# Evaluation of the Extent of Knowledge and Implementation Practices of Supply Chain Management by Community Pharmacists in Anambra State

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## Abstract

Community pharmacies make pharmaceutical products accessible to a large population of people in the society and to achieve this role efficiently, there should be sufficient knowledge and practices on supply chain management by the community pharmacists. The main objective is to evaluate the extent of knowledge and implementation of supply chain management practices among community pharmacists in Anambra State, Nigeria. A descriptive cross-sectional survey was carried out from May 2018 to August 2018. One hundred and fifty-four self-administered questionnaires were distributed conveniently during the quarterly annual meeting of the Association of Community Pharmacists in Nigeria, (ACPN), Anambra State chapter. Data analysis was done with SPSS version 25. The demographic characteristics of the respondents were analyzed descriptively using frequency figures, while inferential statistics on relationship and comparison between demographics and other variables was done using Chi-square. There was a relatively good knowledge of supply chain practices among the participants, but they were deficient in their responses on implementation (45%). The participants demonstrated good practice of the different inventory methods such as First-Expire-First-Out (FEFO) and Max-Min systems. The outcome of the finding also showed that those participants with Bachelor to pharmacy as their highest education qualification have a low level of knowledge on out-of-stock of essential health commodities at a p-value of 0.003. The study revealed a poor implementation of Supply Chain Management practices despite the adequate knowledge exhibited by the community pharmacists.

**Keywords:** Supply chain management, implementations, community pharmacists

## INTRODUCTION

Supply chain management spans all movement and storage of raw materials, work-in-process inventory, and finished goods from point of origin to point of consumption (*Rutgers Business School*, 2021). The community pharmacies in Nigeria serve a large number of clients and with their number; they can provide a wide

range of pharmaceutical products (Ekpenyong et al., 2018). In line with this, Pharmacists, or "dispensers" in Nigeria under the National drug policy, make it the responsibility of the pharmacist to supply and distribute the pharmaceutical products, but to achieve this effectively they have to be prepared to be up to date for supply chain practices (FMO, 2003). All these are aimed at making the right product of the right quality available to the customer, in the right condition at the right time and price.

The entire process, from the movement of raw materials and finished goods from point of origin to point of consumption, is a simple way of describing the supply chain (*Rutgers Business School*, 2021). While an integrated approach starting from the very first stage of planning and control of materials, logistics, services, and information from suppliers to manufacturers, wholesalers, retailers, and finally to the end clients is supply chain management(Balal Ibrahim & Adam Hamid, 2001). It is important to note that any risk affecting the supply chain of pharmaceutical and medical products, causes out-of-stock, increase in the price of commodities, and waste of healthcare resources. It also serves as a threat to the nation's healthcare system and the patients' life by hindering access to quality medicines (Schneider et al., 2010). Thus, to be able to serve the large population effectively without room for delays and out of stocks, the procurement of pharmaceuticals, system for quantification of drugs, and an inventory management system must be highly effective and efficient at all times (Chukwu et al., 2016).

A study by Enyinda & Tolliver, in Nigeria, reported that lack of coordination, poor inventory management, absence of demand information, human resource dependency, order management, expiration of health commodities, poor warehousing management, poor temperature control on storage affects the timely supply of pharmaceuticals (Enyinda & Tolliver, 2010). Hence, there is a need to continuously upgrade the skills of trained pharmacists in implementing standard operating procedures for the management of medicines, supplies, and equipment to promote the effective running of the supply chain management practices (Jüttner et al., 2007).

The pharmaceutical supply chain should provide medicines in the right quantity, with the acceptable quality, to the right place and customers, at the right time and with optimum cost to be consistent with the health system's objectives and also it should make benefits for its stockholders (Jüttner et al., 2007; Kapoor, 2018), these include all of the logistics activities, manufacturing operations, and activities with and across marketing, sales, product design, finance, and information technology (Jüttner et al., 2007; Naraharisetti & Karimi, 2010; Sousa et al., 2011). Yet the practice of implementing supply chain of pharmaceuticals in Nigeria is facing many challenges, ranging from inadequate skills and training, insufficient access to technology, and high prices for transport and warehouse rental due to limited competition(Agorzie et al., 2017). Also, inadequate supervision of the distribution process of the pharmaceutical sector has led to the emergence of lots of substandard drugs in circulation this has caused an increase in morbidity and mortality among the populace (Enyinda & Tolliver, 2010; USAID,2018), hence the urgent need to

create awareness of committee pharmacists on the need to improve their skill on supply chain management. Despite the importance of pharmacy supply chain management practices, there is a lack of studies that evaluated the extent of knowledge and implementation practices of pharmacy supply chain management by community pharmacists in Nigeria.

This study, therefore, evaluated the knowledge and implementation of supply chain management and its practices amongst Community Pharmacists in Anambra State.

## METHODS

### Study area

Anambra is a state in south-eastern Nigeria comprising of twenty-one local government areas with a population of 4,055,048 people (Bashorun et al., 2014). The state capital is Awka. It shares boundaries with Delta state to the west, Imo State and Rivers State to the south, Kogi State to the North, and Enugu to the East. The state is divided into three senatorial zones namely the south, the north, and the central senatorial zone(Tran et al., 2019). The indigenous practices in Anambra State are farming and business. The languages spoken are English and Igbo. The state has two teaching hospitals, a general hospital in every Local Government Area, and a Primary Health Care Centre in every village in Anambra State (Bashorun et al., 2014). The Pharmacists' Council of Nigeria has its pharmaceutical central store in Awka, the capital of Anambra state. At the time of conducting this study, there were 230 registered community pharmacies found mainly in the major cities throughout Anambra.

### Inclusion criteria

Participants included in the study were only registered community pharmacists in the state for the year 2018 while those without full pharmacist licenses were excluded from the survey.

### Study design

The study was a cross-sectional descriptive study carried out among community pharmacists in Anambra State, South eastern Nigeria, using a semi-structured questionnaire.

### Sampling technique and sample size determination `

The study population involved all the registered community pharmacists working in the 230 registered community pharmacies in Anambra State as at June 2018.

### Sample Size calculation

The representative sample to be used for the study was begotten using the Yamane formula.

n= N/(1+N(e^2))

Where; n=Sample size

N=Total population of the community pharmacists

e= Level of precision = ± 5%, with confidence interval set at 95%

Thus the sample size

n= 230/(1+230(〖0.05〗^2)) =146.0

5% extra was included to take care of incorrectly filled questionnaires

Total sample size=154

The questionnaire was conveniently distributed to 154 community pharmacists who gave their consent during the second quarterly meeting of the Association of Community Pharmacists of Nigeria (ACPN) in Anambra State held in June 2018. In the meeting, a good representation of pharmacists from every part of the State was in attendance.

**Study period**

The study lasted from May 2018 to August 2018

**Development of a questionnaire**

The Questionnaire instrument was adapted from an unpublished study on Supply Chain Management. Adjustments were made to suit the objectives of the study.

**Validation of the study Instruments**

The Questionnaire instrument was face validated by the Coordinator of Supply Chain Management, in Nnamdi Azikiwe University, Dr. Sunday Nduka, and Pharm. Otuto Amarauche Chukwu, an expert in the Supply Chain Management,who works in Abuja. Corrections made were implemented. The instrument was pretested on 10 community pharmacists in Enugu State, Nigeria. The responses from the pre-test were used to further improve clarity and flow.

**Data Analysis**

Data collected were entered into an excel sheet and then transported into SPSS Version 25 software for analysis. The demographic characteristics of the respondents were analyzed descriptively using frequency figures while inferential statistics on relationship and comparison between demographics and other variables was done using Chi-square.

**Ethical Statement**

Ethical approval was gotten from Nnamdi Azikiwe University Teaching Hospital (NAUTH) Ethics Committee with the reference number NAUTH/ CS/ 66/ VOL. 11/ 099/ 2018/ 040. Oral consent was sought from the Community Pharmacists before filling the questionnaires.

**RESULTS**

A total of 154 questionnaires distributed to the community pharmacists were retrieved. The demographic characteristics of the participants (Table 1) showed that more than half of the respondents were females (52.2%), most of them have Bachelor of Pharmacy ( BPharm) as their highest qualification and have been practicing for about 11-15 years. Although, a number of the respondents (37.7%) were not familiar with supply chain management of health commodities, interestingly, most of them claimed to have good knowledge of the different types of inventory systems in supply chain management (87%) (Table 2). In the section on Quality of pharmaceutical products in their outlets (Table 3), 57% responded that the expiration of product on the shelf occurred less often at a significant value of 0.003.

**Table 1: Socio-demographic characteristics of Pharmacists in Anambra state**

| **Respondents Characteristics** | | **Frequency n (%)** |
|---|---|---|
| **Gender** | | |
| | Male | 73 (47.4) |
| | Female | 81 (52.6) |
| **Age in years** | | |
| | 21-30 | 37 (24.0) |
| | 31-40 | 55 (35.7) |
| | 41-50 | 38 (24.7) |
| | ≥ 50 | 24 (15.6) |
| **Qualification** | | |
| | Bachelor of Pharmacy (BPharm) | 154 (100.0) |
| | Master's Degree | 80 (51.9) |
| | Postgraduate Fellowship | 16 (10.4) |
| **Years of practice** | | |
| | 1 – 5 years | 19 ( 12.3) |
| | 6 – 10 years | 35 ( 22.7) |
| | 11-15yrs | 40 ( 26.0) |
| | 16-20years | 30 ( 19.5) |
| | ≥20 years | 30 ( 19.5) |

**Table 2:** Respondents knowledge of Supply Chain Management and Logistics

| | | | **χ2, (p-value)** | | | |
|---|---|---|---|---|---|---|
| | Responses | n (%) | Gender | Age | HQ* | Experience |
| Extent of familiarity with supply chain management of health commodities. | Not very familiar | 34 (22.1) | 0.324 (0.956) | 13.079 (0.159) | 8.307 (0.216) | 8.035 (0.782) |
| | Not familiar | 58 (37.7) | | | | |
| | Familiar | 46 (29.9) | | | | |
| | Very familiar | 16 (10.4) | | | | |
| Extent of familiarity with what medicines logistics and supply chain management entails. | Not very familiar | 34 (22.1) | 3.057 (0.383) | 6.871 (0.651) | 1.069 (0.983) | 7.628 (0.813) |
| | Not familiar | 58 (37.7) | | | | |
| | Familiar | 46 (29.9) | | | | |
| | Very familiar | 16 (10.4) | | | | |
| Extent of practice of medical logistics and supply chain management activities. | Not often | 66 (42.9) | 5.771 (0.123) | 6.743 (0.664) | 4.521 (0.607) | 10.819 (0.544) |
| | Less often | 60 (39.0) | | | | |
| | Often | 21 (13.6) | | | | |
| | Very often | 7 (4.5) | | | | |
| Knowledge of the different types of inventory systems in supply chain management. | Yes | 134 (87.0) | 2.792 (0.075) | 4.070 (0.252) | 5.020 (0.081) | 2.023 (0.732) |
| | No | 20 (13.0) | | | | |

*HQ: Highest qualification.

**Table 3:** Quality of pharmaceutical products in their outlets

| | | | χ2, (p-value) | | | |
|---|---|---|---|---|---|---|
| | Responses | n (%) | Gender | Age | HQ | Experience |
| Occurrence of experience of stock out of essential medicines in your facility. | Not often | 114 (74.0) | 2.139 (0.544) | 7.757 (0.559) | 6.986 (0.322) | 6.205 (0.905) |
| | Less often | 34 (22.1) | | | | |
| | Often | 3 (1.9) | | | | |
| | Very often | 3 (1.9) | | | | |
| Occurrence of products expiration on the shelf. | Not often | 52 (33.8) | 0.799 (0.850) | 5.092 (0.826) | 19.598 (0.003) | 13.764 (0.316) |
| | Less often | 92 (59.7) | | | | |
| | Often | 7 (4.5) | | | | |
| | Very often | 3 (1.9) | | | | |
| Stocking of cold chain health commodities. | Yes | 130 (84.4) | 0.077 (0.477) | 3.362 (0.339) | 4.391 (0.111) | 3.756 (0.440) |
| | No | 24 (15.6) | | | | |
| | Not sure | 0 (0.0) | | | | |
| Knowledge of the different types of inventory control systems and practices on the premises. | Max-Min | 74 (46.8) | | 1.283 (0.973) | 0.450 (0.978) | |
| | First expired, first-out (FEFO) | 124 (80.5) | | | | |
| | Lean ordering | 65 (42.2) | | | | |
| Type of the "Max-Min inventory control system, practiced in premise. | Forced ordering system | 40 (26.0) | 1.782 (0.410) | 3.170 (0.787) | 3.309 (0.507) | |
| | Continuous review system | 55 (35.7) | | | | |
| | Standard system | 20 (13.0) | | | | |
| Type of logistics records kept. | Stock-keeping record | 153 (99.4) | 0.179 (0.914) | 3.954 (0.683) | 0.896 (0.925) | |
| | Transaction records | 119 (77.3) | | | | |
| | Consumption records | 71 (46.1) | | | | |

Numbers in parenthesis indicate percentage response. HQ: Highest qualification

Most of the pharmacists responded that they encounter few challenges that affect the distribution of the pharmaceutical product in their premises (Table 4), by responding that they have a backup generator for light supply in case of a power outage to power the cold chain products (92.9%) and an adequate number of staffs to run the logistics system in their respective premises (96.1%). Surprisingly, most of the participants responded that they apply best practices of supply chain management in their service delivery (Table 5).

**Table 4:** Challenges and Constraints that Affect the Distribution of Pharmaceutical Product

| | | | **χ2, p-value** | | | |
|---|---|---|---|---|---|---|
| | Responses | n (%) | Gender | Age | HQ | Experience |
| Presence of backup electrical system to power cold chain equipment. | Yes | 143 (92.9) | 1.925 (0.141) | 4.089 (0.252) | 5.408 (0.067) | 1.745 (0.783) |
| | No | 11 (7.1) | | | | |
| | Not sure | 0 (0.0) | | | | |
| Collation of data on the activities that are carried out on the premise. | Yes | 99 (64.3) | 1.494 (0.474) | 2.411 (0.878) | 2.130 (0.712) | 4.780 (0.781) |
| | No | 46 (29.9) | | | | |
| | Not sure | 9 (5.8) | | | | |
| Collation of data gathered to make decisions in the premise. | Not often | 1 (0.6) | 2.629 (0.622) | 11.832 (0.459) | 10.496 (0.232) | 0.583 (0.834) |
| | Less often | 19 (12.3) | | | | |
| | Often | 54 (35.1) | | | | |
| | Very often | 25 (16.2) | | | | |
| Presence of an adequate number of staff to run the logistics system in the premises. | Yes | 148 (96.1) | 0.496 (0.391) | 0.345 (0.951) | 0.312 (0.856) | 3.810 (0.432) |
| | No | 6 (3.9) | | | | |
| Knowledge level of staff. | On –the –job experience | 95 (61.7) | 0.0005 (0.550) | 0.128 (0.988) | 0.064 (0.969) | 0.999 (0.910) |
| | Certification | 104 (67.5) | | | | |
| | External training | 37 (24.0) | | | | |
| | Others | 0 (0.0) | | | | |
| | None | 0 (0.0) | | | | |

*HQ: Highest qualification.

**Table 5:** Assessment of supply chain management best practices for effective and efficient distribution

| Variables | Responses | n (%) | χ2, (p-value) | | | |
|---|---|---|---|---|---|---|
| | | | Gender | Age | HQ | Experience |
| Site of storage logistics data and information. | Electronic | 153 (99.4) | 65.898 (0.005) | 2.219 (0.898) | 0.668 (0.955) | 2.544 (0.960) |
| | Paper | 153 (99.4) | | | | |
| | Others | 5 (3.2) | | | | |
| Storage of stock records? | Yes | 153 (99.4) | 0.907 (0.526) | 1.812 (0.612) | 1.033 (0.597) | 4.160 (0.385) |
| | No | 1 (0.6) | | | | |
| Storage transaction records? | Yes | 119 (77.3) | 0.861 (0.231) | 2.508 (0.474) | 3.998 (0.135) | 3.708 (0.447) |
| | No | 35 (22.7) | | | | |
| Storage of consumption records? | Yes | 71 (46.1) | 0.012 (0.520) | 7.186 (0.066) | 1.396 (0.498) | 8.502 (0.075) |
| | No | 83 (53.9) | | | | |
| Type of "Max-Min inventory control system" practiced consistently in premise. | Forced ordering system | 40 (26.0) | 1.782 (0.410) | 3.170 (0.787) | 3.309 (0.507) | 3.679 (0.885) |
| | Continuous review system | 55 (35.7) | | | | |
| | Standard system | 20 (13.0) | | | | |
| Type of inventory control systems practiced in premise. | Max-Min | 72 (46.8) | 0.607 (0.738) | 1.283 (0.973) | 0.450 (0.978) | 1.892 (0.984) |
| | First expired, first out (FEFO) | 124 (80.5) | | | | |
| | Lean ordering | 65 (42.2) | | | | |

*HQ: Highest qualification

## DISCUSSION

In this study, the knowledge of Supply Chain Management Practices among community pharmacists in Anambra State were seen to be below average and is perhaps responsible for the low levels of implementation observed as well. Interestingly, the arguments of Meijboom et al., on developing a supply chain orientation in health care were also emphasized in the article of Aronsson et al,(Meijboom et al., 2010) where he reported that supply chain management should be an overall philosophy in providing health care providers with adequate knowledge and orientation. This will provide them enough skill to handle unique processes in a structured and a flexible way (Meijboom et al., 2010).

The low level of implementation seen in this study has also contributed to the inaccessibility and unavailability of basic health commodities in these community pharmacies, this is also seen in the review conducted by Jan de Veris, (2011) where he reported that many health care organizations have recognized the importance of adopting supply chain management practices yet the application of techniques, methods and best practices originally developed in an industrial setting is often problematic (Vries & Huijsman, 2011). This study did not observe any challenge in the application of Supply Chain Management.

A review by Kappor (2018) identified challenges in the practice of Pharmaceutical Supply Chain as the following, lack of coordination, inventory management, human resource dependency, shortage avoidance, expiration, warehouse management, temperature control, and shipment visibility (Kapoor, 2018), but in this study, most of the items mentioned above were not identified as an obstacle to the implementation of good practice in supply chain management. More studies are encouraged in aspect to explore other possible challenges encountered by community pharmacists in Anambra state, Nigeria, in supply chain management.

**Study Limitation**

The convenient use of only community pharmacists that attended the second quarterly meeting for the survey may not be a true representative of the population and may not allow an even distribution of the pharmacists in Anamba state. The sample size used may not allow for generalization of the community pharmacists in Nigeria. Despite the limitations, this research could serve as a pilot for a more detailed survey that will cover a larger population to improve the implementation of supply chain management practices by community pharmacists in Nigeria.

## CONCLUSION

Community pharmacists in Anambra state, Nigeria have low of knowledge in supply chain management. The key findings of this study reveals that there are shortage of skills in supply chain management practices including product selection, forecasting q, procurement, inventory control, logistics management information systems, monitoring, and evaluation.

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**Competing interests:** The authors declare that they have no competing interests

**Ethics approval and consent to participate**

The study was conducted following the ethical standards of the Helsinki Declaration (1964, amended most recently in 2008) of the World Medical Association. Ethical approval to carry out this study was gotten from Nnamdi Azikiwe University Teaching Hospital Ethics Committee. The confidentiality and anonymity of the study participants were fully maintained by not including any identity identifier in the questionnaire.

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