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RETAIL PHARMACY SUPPLY CHAIN PERFORMANCE - A COMPARISON OF TYPICAL CONFIGURATIONS OF ENGLAND AND NIGERIA

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ABSTRACT

Retail pharmacy outlets play an important role in any society, they serve as the connecting point through which consumers can get their medications. Antibiotics are prescription drugs used in the treatment of infection which can be obtained from community pharmacies however, challenges in the supply chain can result in these products going out of stock which is bad for both the patient and the business. Therefore, the aim of this paper is to address the central research question which is how can one country learn from the other in order to reduce or prevent stockout of antibiotics in the retail pharmacy settings of England and Nigeria?

Transaction cost framework and supply chain relationship quality (SCRQ) theory are the supporting theories adopted. Multiple case study research strategy is used in this qualitative research. Semi structured interview questions are used to gain insights from respondents who were selected via snowball sampling. Ten interviews were conducted, six in Lagos, Nigeria and four in Essex, England, cutting across independent, small scale and large chain retail pharmacies in both countries. Data generated from the respondents was transcribed, coded and analysed using thematic content analysis technique.

In conclusion, amongst other things, it is noted that the use of software to synchronize the inventory activities of retailers with that of wholesalers, contributes to better efficiency in the operations in retail outlets in England. Technology plays a very important role in ensuring the resilience and reliability of the retail pharmacy supply chain. Incorporating this to the practice in Nigeria will go a long way to enhance supply chain operations thereby reducing cases of stockouts of antibiotics at the retail level.

The thesis is in English and contains 41 pages of text, three chapters and three figures.

Keywords: Retail pharmacy, stock out of antibiotics, England and Nigeria.

INTRODUCTION

The health sector is a vital arm of every society, one of the essential basic duties of any government is to keep its citizens safe and healthy (Whewell, 2010). The availability of quality healthcare that has easy accessibility and affordability for all members of a society is important because of the substantial health care costs that ill-health is often associated with (Wagstaff, 2002). The pharmacy sector is an integral part of the health sector. It comprises of various branches such as industrial pharmacy, hospital pharmacy, pharmacy education, community/retail pharmacy practice to mention but a few of them. Currently, community pharmacists play an important role every society as they take responsibility for patient's medicine related needs and ensure accessibility to healthcare. (Chandra et al., 2009)

As explained by Applebe & Wingfield in 2013, a community pharmacy business is described as one in which the retail sale of medicinal products is carried out which is done under the governing laws and it is the duty of the responsible pharmacist to ensure safe and effective running of the pharmacy. Therefore, the supply chain or inventory management must be prioritized to ensure uninterrupted availability of drugs to sustain an effective business process.

According to (Mentzer et al., 2011), the definition of a supply chain is that it is made up of a set of three or more organizations, directly connected via the upstream and downstream movement of goods, services, money, and information from source to a customer. Supply chain management (SCM) is focused on managing the upstream (supplier) and downstream (customer) relationship in other to achieve profitable outcomes for the overall good of all parties involved in the chain (Christopher, 2016). The flow of activities in the supply chain of retail pharmacy in the pharmacy sector focuses heavily on the final consumers' needs because it operates in its downstream sector and the income is generated mainly from direct sales to customers. Thus, efficient inventory management is required to ensure that patients get the medications that they need especially where prescription only drugs such as antibiotics are concerned. (Rees, 2011)

Antibiotics are classified as prescription only drugs across the world, they are useful for fighting infections and are sold very frequently in retail pharmacies due to its benefits in treating bacterial infections (Auta et al., 2019). Some classes of antibiotics commonly prescribed include Cephalosporins, Penicillin's, Macrolides, Quinolones, etc.

As a result of increasing demand on pharmaceutical supply chains by patients, payers, prescribers, regulators, health care practitioners, and other key stake holders (Rees, 2011), retail pharmacies need to be at the top of their game to ensure that the inventory levels are well managed to prevent stockouts because poor in-store replenishment often compromises efforts to maintain high service levels within retail shops. This is one of the factors which causes the system to fail at the final point of sale, where in-store availability has its greatest impact on consumer behaviour and sale. (Mckinnon et al., 2007)

In this paper, the focus is to understand the supply chain management (SCM) system (inventory management) especially as it affects the supply chain (SC) performance for antibiotics in the retail pharmacy sector for the pharmacies in England and in Nigeria.

Research question

The central research question which is to be addressed is: How can one country learn from the other in order to reduce or prevent stockout of antibiotics in the retail pharmacy settings of England and Nigeria?

The goal behind this research is to gain insight into the current methods of inventory management applied in both systems and to see how each society can learn from the other to be able to improve on the current operations regarding stocking of antibiotics within the retail pharmacy sector and consider activities that can be realistically adopted from one country to the other (i.e. the British system to that of Nigeria or vice versa) that will be of benefit to the development of their supply chain management systems in the future.

To achieve this, the following research tasks will be carried out which include:

- Identifying the typical distribution network for antibiotics
- To understand the supply chain cost structure and on-shelf availability
- Identifying the supply chain reliability and resilience situation in both countries

These objectives will enable us to identify the performance gaps, so we can see how one system can learn from and realistically apply the practice to the other. To do this we need to understand and compare the efficiency, reliability and cost implication of the type of inventory management system that is being operated in both societies by looking at how frequently stock taking is carried out in the store, time taken to replenish stock shortages, supply network, the major class of antibiotics that is prone to be out of stock in the pharmacy, brand switching, and the cost implication of stock out on average monthly sales.

Multiple case study research strategy will be adopted for this qualitative work, by conducting semi structured interviews with procurement managers of ten retail pharmacy stores across both countries; four pharmacies in England (Essex), and six pharmacies in Nigeria (Lagos). Only information relevant to this work would be requested and no patient sensitive information is required. The results will then be analysed using coded transcription, thematic content analysis technique to compare the performance of the supply chains based on stocking antibiotics in both countries, to bring out some conclusions based on the key issues highlighted from the interviews. APA referencing style is used to reference the articles and textbooks used.

Background information

We would look at the general overview of the pharmacy sector, role of industrial and retail pharmacies, and their regulations. Pharmacy as a discipline is comprised of different divisions ranging from pharmacy industry, hospital pharmacy, pharmacy education (academia), community/retail pharmacy practice, Pharmacy in Government, in Non-governmental organisations etc. However, for this paper, we will discuss on a few particularly those relating to drug distribution and retail sales i.e. pharmacy industry and retail / community pharmacy practice.

Industrial pharmacy

The pharmacy industry is mainly concerned with the business of research, development and drug manufacturing which is highly capital intensive. Investment in healthcare technologies is risky and expensive in the drug creation process, sometimes only 1 in 8,000 drug items discovered eventually makes it to market, and only 30% of those that are launched achieve significant return on investment (ROI) hence even if there are any returns, it will only be gathered over the long term (Whewell, 2010). Some examples of leading pharmaceutical companies in the world according to ProClinical 2019 include, Pfizer, Roche, Johnson & Johnson, Sanofi and Merck amongst others.

The development of new products is at the heart of the research-based pharmaceutical industry. In other to achieve success in a country where they are established, the level of educational provision and attainment available or encouraged among the people in any given country contributes largely to the success of the organisation. Pharmaceutical manufacturing industries majorly carry out research and utilize health care technologies therefore, highly skilled and knowledgeable workforce is required to optimize output and companies must be sure that they will be able to attract and retain the talents that they need before investing in establishing their facilities in a chosen location. (Whewell, 2010)

After the drug has been developed, passed through various regulatory bodies and certified fit for use in the treatment of infections, it needs to be delivered to the end users (patients) so, an efficient supply chain system is required to ensure that patients can readily access the medication in other to get its health benefit. There is an increase in global pressure to constrain health care budgets especially for prescription medicines (including antibiotics) which can be achieved by improving the cost, efficiency, and effectiveness of drug manufacture as well as the supply chain system (Rees, 2011)

In Nigeria, the market for drugs is large and continues to grow. About 70% of the drugs available in Nigeria are imported despite the expectation that local industries will produce between 50%-70% of drugs required to meet the nation's needs. Rather, less than 50% of the existing pharmaceutical manufacturers are actively in the business of manufacturing (i.e. only about 60 out of over 130 manufacturing companies). (Erhun et al, 2001)

Retail / Community pharmacy

Community pharmacy provides the connection between drug manufactures and the patients. In other for people in the society to be able to get access to the medication produced by the big pharmaceutical companies there must be the end retailer, and this is the role of the community pharmacy because they are able to provide the drugs to patients based on the prescribed dosage and quantity that they need. (Rees, 2011)

The political process through which each county evolves determines how the country's vision is formed, the result in some ways reflect and express the cultures and values in which the society is rooted, and it encompasses the regulations that govern various institutions within that society (Whewell, 2010). There are regulations which govern the formal pharmaceutical retailing practice

in most countries around the world. These regulations affect issues regarding ownership, staffing, medicines, prescriptions and prices. (Lowe & Montagu, 2009)

In the next chapter, we will discuss the literature review which is relevant to this research. We would also consider briefly, the regulatory systems that govern the retail pharmacy practice both in England and in Nigeria as well as the classes of retail pharmacy that are predominant in both societies. We would get some insight to the supply chain system that operates in both countries, narrowing it down to the procurement of antibiotics in registered community pharmacy practices.

1. LITERATURE REVIEW

To adequately address the research question, in this chapter we will look at some of the relevant theories in supply chain management that corelate to this discussion, classes of retail pharmacies that exist and the inventory management style that is adopted in the stocking of medications which include antibiotics.

1.1. Transaction cost conceptual framework

The framework of transaction cost economics is based on the theory authored in 1937 by Coase in his paper ‘‘The nature of the firm’’. Transaction cost for an organisation refers to its cost of doing business that involves creation of goods or services which includes both internal costs such as cost of labour or external costs such as government fees, taxes and these costs must be kept as minimal as possible so that an organisation can stay profitable (Yousuf, 2017).

‘‘The basic claim is that an appropriate alignment of transactions with the corresponding governance structure will allow an organization to economize on its costs’’ (Schneider et al., 2013, 243)

In the retail pharmacy sector, this will include the cost of registration of the premises or the cost of procuring drugs from a wholesaler/ distributor, these kinds of expenses must be maintained at a low rate for the business to stay profitable. One of the ways to achieve this through the supply chain is to establish trusted, and efficient networks with suppliers to ensure that depleting stock levels are replenished within the quickest time and at the least possible cost. Establishing sustainable network relationships with the right partners and monitoring their performance in the supply chain is the main concern of transaction costs. (Yousuf, 2017)

1.2. Theory- Supply Chain relationship quality

In recent times, most organisations have been noted to be connected in a networked supply chain system, a trend that is attributed to the rise in international corporations (globalization) with more firms focusing on core activities and the need to outsource for goods or services that are not within the organisations core specialty. Hence, managing these interdependent relationships are crucial. (Chen & Paulraj, 2004) Companies have been encouraged to establish better relationships with their suppliers, based on the impact of the quality of SC relationship on quality of its performance as examined by Fynes et al. in 2005. To explain types of supply chain relationships, different theoretical frameworks have been adopted by researchers which include transaction cost theory among others, which have contributed to the modelling of SC relationships (Robicheaux & Coleman, 1994).

Amongst these various frame works, certain dimensions of SC relationship process have stood out as common components that interact with each other and they include trust, adaptation, communication, dependence and interdependence, commitment and co-operation which are combined to what is referred to as supply chain relationship quality (SCRQ). The relationship between business partners goes a long way to impact the business performance therefore for the success of the entire supply chain, maintaining quality relationships is key. (Atrek et al., 2014)

The flow of information and inventory is fundamental within the wholesale and retail industry. In other for retail pharmacies to ensure that they have enough drugs in store, many adopt the use of a storeroom to keep excess stock of drugs which will be used to replace depleted shelf stock levels. However, with the advancement in technology and efficient supply chain management, retailers can establish and maintain better relationships with their wholesalers to the extent that their stock levels can be replenished based on Just-in-Time system. (Tan, 2001).

It was also concluded that the SCRQ indeed has a positive and profitable impact on the quality of its performance and in order to enhance it, companies should focus on the management of supply chain relationships (Vorst et al., 1998).

1.3. Retail (Community) pharmacy practice

Pharmacy profession is one that has been able to strike a harmonious balance between professionalism and business. Community pharmacy practice embodies both the professional (pharmaceutical care) and business sides of pharmacy and the main activities carried out in retail pharmacy outlets include dispensing and sales of drug (Kayne, 2005). Over the years there have been continuous changes in the trend of activities in community pharmacy practice across the world. As of today, the direction is focused towards increasing patient care by ensuring patients optimize the benefits of their medication (Remington, 2006).

In pharmacy operations, inventory (which refers to the stock of pharmaceutical products held in the store) represents the largest current asset, as well as liquid asset in pharmacy (Ali, 2011). These products include prescription drugs (such as antibiotics), Over the Counter (OTC) medications, herbal and ayurvedic medications and some other medical consumables and devices. Typically, patients walk into the pharmacy to request for drugs depending on their health needs or as prescribed by a physician. Supply chain design and delivery for the pharmacy is more effective when the usefulness of a product is understood, and this enhances patient's compliance in other for them to fully benefit from treatment (pharmaceutical care). (Whewell, 2010) To achieve this, the pharmacy must ensure that the dugs required for the patients' needs are always available (on the shelves or in store) and never out of stock.

Retail pharmacies typically purchase stock from wholesalers or distributors who serve as a bridge between manufacturing companies and retail pharmacies because manufacturing companies prefer to sell in large volumes at a time and the capacity that they offer per sale cannot be met by individual retail pharmacy outlet. Distributors (Wholesalers) on the other hand have the capacity to buy bulk volumes from different manufacturing companies at a good rate and then they resell to pharmacy shops. Wholesalers who provide a wide portfolio can attempt to win over their pharmacy customers by offering discount deals on bulk purchases and other arrangements. In more advanced societies, one common form of tie-in that is offered is to provide the pharmacist with sophisticated software that will manage their dispensing process, inventory replenishment and submissions for reimbursement. Technology plays an important role in healthcare delivery and the healthcare environment especially in influencing the ability to provide healthcare services by making delivery faster, better, cheaper and more accessible to more people. (Whewell, 2010)

In most countries in the world, formal pharmaceutical retailing is governed by regulations regarding owning, staffing, drugs, prescriptions and prices. The ability to enforce these regulations is difficult or impossible in most low and middle-income countries because the regulatory process is constrained by limited government capacity and complicated by the fragmented nature of pharmaceutical retail markets. (Lowe & Montagu, 2009)

1.3.1. Regulations in retail pharmacy sector both in England and Nigeria

In the UK there are two main guidelines that regulate the rights to own community pharmacies which are the Medicines Act 1968 and the National Health Service (Pharmaceutical Services) Regulations 1992, made under the conditions of the NHS Act 1977 (Ottewill & Magirr, 1999). Only licenced and registered pharmacy premises can be in operation and the registration of the premises must be renewed annually by paying the registration fees. It also compulsory that a qualified registered pharmacist must always be on ground whenever the pharmacy is open. (Kayne, 2005)

‘‘The Medicines Act restricts the ownership of community pharmacies to self-employed, registered pharmacists running their businesses as sole traders (often termed ‘independents’); partnerships of registered pharmacists; and bodies corporate. In the case of bodies corporate, under the provisions of Section 71, ‘the keeping, preparing and dispensing of medicinal products…is under the management of a superintendent’, who must be a registered pharmacist. Section 75 requires all owners to register their premises with the Royal Pharmaceutical Society of Great Britain (RPSGB)’’ (Ottewill & Magirr, 1999, 40).

The National Health Scheme (NHS) established on the 5th of July 1948 by the then minister of health Aneurin Bevan, is till date a government supported health scheme that ensures complete and free health care at the point of use for the citizens in the United Kingdom and it is funded by tax payer’s money. Community pharmacists under the NHS are paid for dispensing prescriptions from general practitioners (GP’s), although they mainly give health advice alongside to patents. (Silcock et al., 2004) Community pharmaceutical services (CPS) is founded on an ‘independent contractor’ model in which local health authorities and community pharmacy owners are involved in this contract (Ottewill & Magirr, 1999). Being a profit driven organisation, the NHS is obliged to ensure that cost is kept as minimal as possible, one of the ways this can be achieved is through establishing better drug supply chain management where its buying agency enters direct partnership with suppliers in other to get the best rates (Ritchie et al., 2000).

The trend in the community pharmacy setting allows for the ownership of numerous retail pharmacy stores and they are linked to the NHS. This has resulted in the continuous decline in the number of independents outlets while in the number of small and large specialist chains owned community pharmacies which have the financial capacity for expansion, are on the increase. (Ottewill & Magirr, 1999)

In Nigeria, the Government has put in place several laws to regulate and control the manufacture, sale, and distribution of drugs in Nigeria. According to Erhun et al. in 2001, some of these laws include: Pharmacists Council of Nigeria, Decree 91 of 1992, which is responsible for the registration of pharmacies, maintaining the register of qualified persons to practice as pharmacists and the regulation and control of pharmacy practice in Nigeria. It also requires that a registered and licensed superintending Pharmacist oversees the pharmacy anytime it is opened for business. National Agency for Food and Drug administration and control Decree No. 15 of 1993, the agency commonly referred to as NAFDAC. Its main responsibility is to regulate and control the food and drugs that are manufactured locally, importation, exportation, sales, distribution and advertisement of such items.

Despite the several regulations, there are still numerous challenges facing the drug distribution system in Nigeria especially due to the lack of enforcement of these regulations (Goodman et al., 2007). Other problems include low returns on investment due to low demand from customers, the prevalence of numerous illegal drug distribution outlets and the challenge of fake or Counterfeit drugs (Oparah & Kikanme, 2006). The drug distribution network within the country is in a state of disorder because it consists of open markets, patent medicine stores, community pharmacies, private and public hospitals, wholesalers/importers and pharmaceutical manufacturers, many of whom do not function according to prevailing government regulations (Erhun et al., 2001). Due to the high cost of health care and the drug seller market (also known as patent medicine vendors) is extremely informal in the west Africa region, low income earners prefer to patronise unlicensed drug retail suppliers such as medicine sellers on the road side particularly located in remote places (Goodman et al., 2007).

The health care delivery environment in Nigeria is a peculiar one in the sense that most of the cost burden is borne by the patient. Although the National health insurance scheme (NHIS) mandated by the government to be provided for all employees by their employers, was recently implemented,

which has helped relieve the cost burden for patients, they still need to pay for their medications when purchasing form a retail community pharmacy because the scheme does not cover drugs purchased form the retail pharmacy and the drugs sold there are not subsidised for patients. (Oparah & Kikanme, 2006)

Retail pharmacies offer both products and services to their customers. Typically, patients walk into the pharmacy with a prescription to purchase their medication and they would need to speak with a qualified pharmacist who provides counselling on how the medication should be used. Hence, using the customer contact dimension as a classification method, health care service which is offered in the retail pharmacy setting is classified as a high contact service (Lovelock, 1983).

According to Jambulingam et al. in 2004, there were various basis for classifying retail pharmacies which can include the level of contact with customers or the number of stores and the type of merchandise sold. For this study we will consider the classification of retail stores based on the number of stores. They include:

- Independent pharmacies – this refers to pharmacies with less than four stores typically owned by a sole proprietor.
- Small chain refers to pharmacies with about four to ten stores under a chain.
- Large chains are comprised of more than ten stores.

These pharmacies explore different methods to ensure that they remain competitive through variations in level of services which they provide to their customers, one of the key ways of achieving this is by ensuring that the products needed by customers are on the shelf or can be sourced for within the shortest time possible.

The most common types of formal retail pharmacy settings available in Nigeria are the independent pharmacies and a few chain pharmacy outlet while in England, there are more chain pharmacy stores and fewer independent retail pharmacies. According to Ekpenyong et al. in 2018, there were over 3700 registered community pharmacies in Nigeria, most of which are in Lagos while England has over 11,600 outlets.

1.4. Supply chain management in retail pharmacy

A supply chain as defined in 2011 by Mentzer et al., is collection of three or more entities that directly take part in the upstream and downstream movement of products, services, finances, and information from its origin to a customer. Supply chain management can be described as a combination of different approaches which consists of planning and control of the flow of materials or resources from suppliers to end users (Jones & Riley, 1985). The primary focus of SCM is mainly with the coordination of both upstream (supplier) and downstream (Customer) relationship in other to achieve profitable outcomes for the overall good of all parties involved in the chain. (Christopher, 2016).

Due to increasing competition businesses must constantly been on the lookout for cheaper sources for their supplies from other regions of the world. Globalization of supply has compelled companies to seek more successful ways to coordinate the movement of materials in and out of the organisation hence, a direction toward establishing better relationships with suppliers is essential to such coordination. (Mentzer et al., 2011)

In the pharmacy sector, retail pharmacies operate in the downstream sector of the supply chain because they sell directly to the final consumers, while their supplies are sourced from either wholesalers or distributors upstream. Understanding the usefulness of a product enables the supply chain design and delivery to be more effective, and this will enhance compliance for patients who in turn will fully benefit from the treatment. (Whewell, 2010) This is particularly important with the use of antibiotics to avoid resistance.

An individual retail pharmacy business can be a part of many different supply chains at the same time, i.e., it functions as a central organisation inside a network (Vorst et al., 1998). Hence, an effective a supply chain as a system is made up of parts which include suppliers of raw materials, the production facilities, distribution services, and customers linked together using the feed forward flow of materials and the feedback flow of information (Stevens, 1989). This flow is illustrated in the figure below.

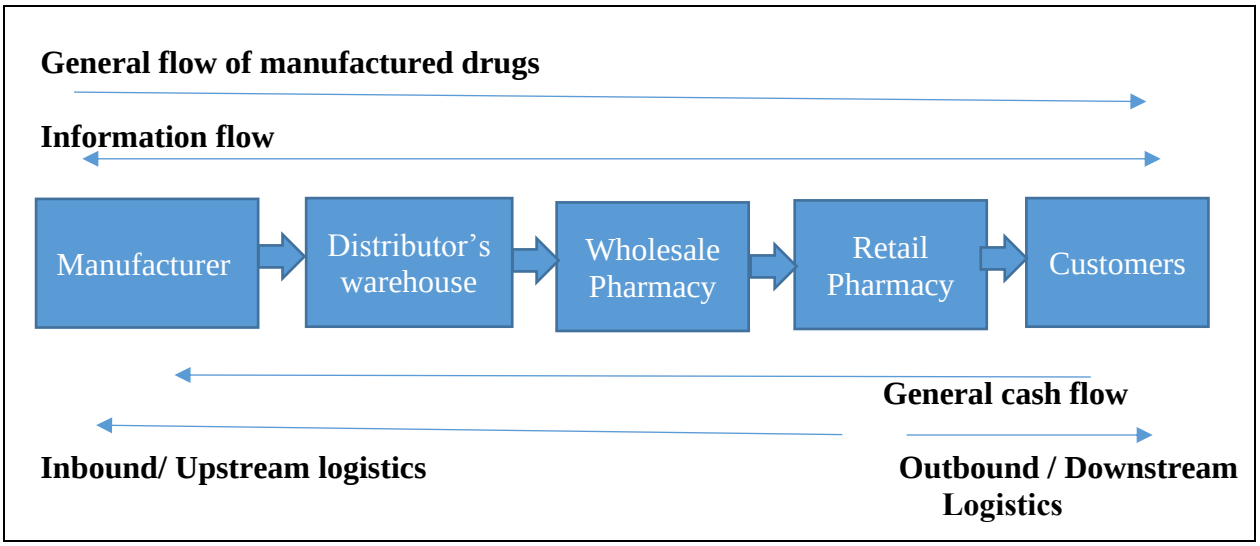

Figure 1. Links and flows in supply chain management
Source: Okoh (2019, 17), author's diagram

Some additional flows which can be created by SCM include reverse logistics, i.e., remanufacturing and product recall: it creates feedback flow of materials while on the other hand, sharing inventory or production scheduling information, creates feed forward flow of information (Vorst et al., 1998).

1.5. Stockouts and inventory managements in retail pharmacies

In a retail pharmacy, stock refers to the items required to be sold to customers such as drugs, medical devices, medical consumables etc. A situation where there is unavailability of products is referred to as stock out. Items being out of stock has a negative impact on the business, persistent cases can greatly affect the profitability of the business, leading to loss of customers, sales and ultimately, failure of the business. (Zinn & Liu, 2008) Hence, keeping stockout at the barest minimum is necessary for a retail store to be able to remain profitable, maintain sales and keep customers loyal (Ehrenthal & Stölzle, 2013). This can be achieved by focusing on the operational processes, ensuring that a dependable supply chain process is utilized.

There are different causes of stock out in a retail outlet which are grouped under two broad categories: in-store causes and out-of-store causes. Out-of -store causes include fulfilment problems from the supplier's end. In-store causes are more common, some of them include

problems in ordering, forecasting the expected sales volume and poor store replenishment. (Aastrup & Kotzab, 2009)

Some of the measures that can be taken within the retailers end to handle stockouts include improvement in the logistics process by maintaining proper organisation within the store and ensuring that depleting stock levels on the shelf are quickly replenished. This can be achieved by assigning staff to do regular checks on a daily or weekly basis and reporting shortages regularly. Form the suppliers end, keeping to the delivery times as agreed with the retail outlet is key to ensuring timely fulfilment. (Ehrenthal & Stölzle, 2013)

In pharmacy operations, the stock of pharmaceutical products reserved within the store to meet future demand is known as inventory. The process of planning, organizing and controlling stock levels within the pharmacy to ensure that supply meets demand is known as inventory management. (Ali, 2011) In traditional supply chain inventory management, orders are the only information exchanged by firms, but information technology now makes it possible for firms to share demand and inventory data quickly and inexpensively (Cachon & Fisher, 2000). Managing materials (pharmaceutical products) within the system is a fundamental part of the business model for all pharmacy settings, especially community and hospital practices. On the other hand, inventory mismanagement causes unnecessary rise in procurement, shortage and carrying costs and an imbalance in the supply and demand equation. (Ali, 2011)

The primary focus of Community pharmacy practice in Nigeria is mainly on drug distribution and inventory management (Oparah & Kikanme, 2006). In the UK the focus is on dispensing prescriptions and give health advice alongside to patents including those on over the counter medications (OTC) (Silcock et al., 2004).

According to Ali in 2001, the three main inventory management methods adopted in pharmacies are visual method, periodic method, and perpetual method. For more effective results some pharmacies adopt a combination of methods.

1. The visual method involves visually observing the stock of drugs on hand in a random manner to determine the inventory level. When compared with the desired amount if there is a shortage, the person in charge of procurement places an order to replenish stock.

2. The periodic method entails regular counting of stock and comparing it with a listing of minimum expected inventory levels at scheduled time interval- this is referred to as ‘stock taking’ and it’s a method commonly used once a month in the pharmacy department of most teaching hospitals in Nigeria. Requisition is made to replenish drug levels when the quantities fall below the minimum required amount.
3. The perpetual inventory management method is commonly adopted in advanced countries, and it is the most efficient way to manage pharmacy inventory. It leverages technology by using computerized system to check the inventory on a continuous systematic basis every time. ‘‘In this system, the inventory on hand is entered into the computer software, and the appropriate quantity of the product is automatically reduced from the inventory when a prescription or medication order is filled’’. (Ali, 2011, 152)

Retailers usually obtain drugs from general wholesalers or large retail or wholesale pharmacies, although mobile distributors operate in some settings (Goodman et al., 2007). In more advanced regions, some retail outlets have started to develop replenishment methods that operate without having to send orders to their suppliers instead, they adopt automatic methods of replenishment which link the retailer to the wholesaler directly in other to obtain a smoother material flow. (Småros et al., 2003)

Vendor-Managed Inventory or VMI is described as one of the most common types of automatic replenishment programs where the vendor is given access to its customer's inventory and demand information (Daugherty et al., 1999). Since VMI offers the vendor access to its customer's sales information, sometimes called sell-through information, rather than its orders, it is possible for the supplier to monitor the inventory level of their customer’s stock and based on joint agreement, are responsible for replenishing the customer’s stock and avoiding stockout. (Småros et al., 2003)

It is important to ensure effective inventory management in the retail pharmacy as there can be severe consequence of failure to deliver an approved, regulated item of healthcare such as a medical device used in surgery, emergency drugs, blood for transfusion or use in operations, transplant organs or a treatment for an acute condition whose treatment requires immediate attention, such as anaphylactic shock which can result in death due to lack of immediate medical attention (Whewell, 2010).

2. METHOD

From the previous chapter, we looked at the introduction to this reserch work with the central research question, objectives and the general overview of the pharmacy sector. Then in chapter one, the discussion was narrowed down to the relevant theories, retail pharmacy sector focusing on the supply chain management system that is applicable, the causes of stock out and inventory management.

In this chapter, we would be discusssing on the method that would be adopted in this research to address the central research queston which is to understand: How can one country learn from the other in order to reduce or prevent stockout of antibiotics in the retail pharmacy settings of England and Nigeria?

To address this question, it is broken down into smaller objectives which are,

- Identifying the typical distribution network for antibiotics,
- To understand the supply chain cost structure and on-shelf availability
- Identifying the supply chain reliability and resilience situation in both countries

To handle these points, qualitative method of research would be adopted for this work. Qualitative research aims at addressing a research problem using theoretical frame works where a qualitative approach is used for the study, data would be collected from participants (mainly procurement officers or pharmacy managers) using notes and a tape recorder, in as close to their natural setting as possible then, the information gathered would be analysed and categorized into themes and patterns with the final report containing extracts of opinions of the participants as well as the thoughts of the researcher. (Creswell & Poth, 2017) This approach to theory development is known as Abduction, where data gathered from interviews are transcribed, themes are derived from coded transcription and patterns are deduced from them. This adds up to either form a new theory or backs up an already existing one. (Saunders et al., 2015)

The qualitative research method has been in use for several decades as a technique to help understand and shed more light on human behaviour. Its first use can be traced to far back 1925 in

the works of Paul Felix Lazarsfeld a psychologist who's work applied the essential elements of qualitative research for the first time (Bailey, 2014). According to Denzin and Lincoln in 2011, they explained that there are no definite rules that can be totally attributed to the qualitative research as it is a made up of several activities that require interpretation and no approach is superior to the other thus making it difficult to give this research method a clear definition. Qualitative research employs the use of interpretive materials such as field notes, interviews, conversations etc. by an observer to give a naturalistic interpretation of the ideology under observation in other to make sense of these materials based on the meaning that people give to them. (Denzin & Lincoln, 2008)

2.1. Research philosophy and design

According to Saunders et al. in 2015, there are two opposing perspectives that have emerged from decades of arguments amongst business and management scholars regarding the diversity in research philosophies which are Unificationisim and Pluralism. Unionists believe that the diversity on research in this field makes it less scientific however Pluralists believe otherwise that rather, the diversity helps to enrich the body of knowledge in the business and management field because of the uniqueness that each approach brings; some of the assumptions of research philosophy include Ontology, Epistemology and Axiology. In this research work, inquiry would be made, on the views of different SCM systems as it relates to the measures that are adopted to manage or prevent stock out of antibiotics with retail pharmacies in England and Nigeria and the Philosophical assumption to be adopted is the ontological approach which takes into consideration the possibility of different realities. (Creswell & Poth, 2017)

''Ontology refers to the assumptions about the nature of reality'' (Saunders et al., 2015, 127), the organisations to be interviewed are existing retail pharmacy businesses. The subjects for the inquiry would be the people who are actively involved in the procurement process within these pharmacies. Considering that their activities as relates to stocking of antibiotics are dependent on the values of the organisation, the intent is to gain knowledge about the practices within the different countries which can be adopted for future practice in the society where stockout is currently not managed efficiently. The ontological philosophy for this research is therefore Pragmatism which incorporates both facts and values, looking at the activities within the physical entities that exist in the natural reality. Pragmatism, a combination of objectivism and subjectivism,

originated in the works of Charles Pierce, Williams James and John Dewey in USA between late Nineteen to early twentieth century. ‘‘For a pragmatist, research starts with a problem and aims to contribute practical solutions that contribute to future practice’’ (Saunders et al., 2015, 14)

Using the ontological philosophy approach, information gathered from various respondents would be categorised into themes based on their specific choice of words to gain insight to the current realities which exist for the inventory management of antibiotics in their places of practice and these themes would be looked at from the different perspectives of both British and Nigerian systems. (Saunders et al., 2015)

Research design takes into consideration the entire process involved in the research process form the formulation of the research question to the collection of data, data analysis and the interptation, up to the point where a logical conclusion is reached (Yin, 2009). The research design which is preferred for this study is the evaluative research design which would enable us to understand the way antibiotic supply is being managed in retail pharmacies both countries. To gain insight into the way inventory of antibiotics are currently being managed, the use of open-ended semi structured questions would be adopted which would provide the interviewee the opportunity to discuss in their own words how things currently operate in the retail store as regards stocking of antibiotics. Evaluative research design is useful for discovering how well systems or organisations work. (Saunders et al., 2015)

2.2. Research strategy

The research strategy centers on the action plan that would be employed in order to address the CRQ. The strategy to be used to answer this question is the multiple case studies from retail pharmacies in the different countries.

Case study as a strategy is suitable for situations where the researcher has no control over the outcomes and when dealing with issues that relate to real life contexts. It involves observing the events directly by interviewing people involved in such events. This strategy is particularly relevant when answering ‘How’ or ‘Why’ research questions where the participants are observed within context. (Yin, 2003) Considering that the research seeks to understand how stock out is managed within the retail pharmacy setting, the participants to be engaged are people who actively

work in these outlets. This offers the opportunity to gain insight into their current practice in other to come up with an applicable resolution based on the information gathered. It is necessary to clearly understand what the ‘case’ to be analysed is (in this project it refers to inventory management activity within each retail pharmacy to be interviewed) so that appropriate steps can be taken to achieve purposeful results. (Baxter & Jack 2008)

According to Yin in 2003, there are three main types of case study research design, for this research, the descriptive type of design will be applied. ‘‘Case study research is richly descriptive, because it is grounded in deep and varied sources of information. It employs quotes of key participants, anecdotes, prose composed from interviews, and other literary techniques to create mental images that bring to life the complexity of the many variables inherent in the phenomenon being studied’’. (Hancock & Algozzine, 2016, 16)

Multiple case study can be employed in a situation where the researcher intends to see if the findings will be replicated among cases (Yin, 2003). Hence, it is utilized here in other to compare outcomes within and between the different cases where the context for each respondent varies slightly one from the other (Baxter & Jack 2008). Case studies help to gain in dept understanding into the topic being studied, providing meaningful insights for those involved. Information gathered from interviews need to be properly reported in other for it to be relevant to readers.

An advantage of using case study strategy in research is that it helps in the contribution to knowledge in the field being examined but a limitation to this is that the results obtained cannot be generalized (Saunders et al., 2015). It is limited in its applications to the contexts under review.

2.3. Data collection

To effectively address the CRQ, questions that seek to provide insight to the set objectives broken down must be formulated. Then it’s essential to gather data from the sources that are relevant to the project. Since the focus is on retail pharmacies, information from personnel involved in drug procurement such as store managers or superintendent pharmacists, provides validity and reliability to this work. People involved in the actual practice are in the best position to give reliable information based on their day to day activities. This the therefore the reason why personnel that are actively practicing in retail pharmacies in England and in Nigeria were interviewed.

The framework under which this research is done involves a qualitative approach where data is collected via recorded interviews with participants and the use of notes in response to the interview questions asked. The data collection technique employed is the mono method qualitative study where semi structured interview questions would be asked to the respondents with the use of a recorder (Appendix ii). (Saunders et al., 2015) This source of data provides a wealth of information particularly on topics where little is known about the subject. Qualitative approach requires a good level of involvement with the respondents considering that they need to be engaged during the process of conducting an interview. The goal is to be able to understand the topic being studied, through the real-life view of the respondent. Part of the draw backs is that it is very time consuming and significant resources might be needed to get adequate and relevant information. (Hancock & Algozzine, 2016)

2.3.1. Sampling

Representation of a population by using a subset of it is known as sampling and there are two main types- Probability and Non-Probability sampling methods (Etikan et al., 2016). Non-probability sampling method would be used in this work specifically the snowballing technique. Snowball sampling is best suited for this research because it provides a convenient way to reach a restricted population (Saunders et al., 2015). The respondents needed in this work are restricted to those practicing in retail pharmacies, so it was essential to rely on a few friends who practice pharmacy in both countries. They helped reach out to pharmacy owners and managers that they know, informing them of the intention for the work, which paved a way to be able to conduct the interviews at the time of arrived at their pharmacy location.

The respondents were given a brief summary of the research, consent was requested in each instance to record the conversation with a recorder and take notes where necessary. They were also informed that it is fine to divulge information related to the research work but any specific details they believe would breach their company values can be omitted. The questions were also structured in a way that company sensitive data would not be required. Only information relating to stocking of antibiotics was the focus.

Snowball sampling has some limitations which include the initial challenge of making contact with the desired population however, in this situation it was possible to leverage on previous contacts, who helped reach out to people currently practicing that were also willing to participate (Saunders

et al., 2015). Another challenge is the possibility of bias since the participants are selected on a referral basis (Etikan et al., 2016).

2.3.2. Description of respondents

The first round of interviews was conducted in Nigeria, the participants include pharmacy owners, pharmacy managers and procurement officers. Despite the wide array of players in the retail pharmacy field in Nigeria, the focus was only on registered and licensed pharmacy practices because this will offer a valid and dependable basis of comparison with the practice in England. The next round of interviews was conducted in England and all the respondents were pharmacy managers in their respective places of practice. In both countries, the interviews were conducted at their places of work except for one of the cases in England where the interview was done at a convenient time specified by the respondent at the close of his work hours. The length of work experience at their respective places of practice ranged from two to ten years in both countries.

In chapter two, the different types of retail pharmacies are discussed which includes independent pharmacies, small chain and large chain outlets, and the respondents cut across all the different types of retail pharmacies in both countries. In Nigeria, four independent pharmacies, one small chain pharmacy and one large chain pharmacy participated in the interviews while in England, one independent pharmacy, one small chain and two large retail pharmacies were represented. This is due the fact that there are more chain pharmacy outlets in England as against Nigeria, which has more independent pharmacies in operation. As a result of increasing competition by chain pharmacies (multiples) in England and some changes in regulations governing pharmacy retailing, this has led to a drastic reduction in the number of independents over the years. (Schmidt & Pioch, 2005)

After collating relevant data from all respondents in both countries, it was saved on a Gmail drive then, all the conversations were transcribed to the word format from which the analysis was carried out. The next step is to link the data gathered to the theory upon which this research is based, and this can be done in several ways.

‘‘One promising approach for case studies is the idea of "pattern-matching" described by Donald Campbell (1975), whereby several pieces of information from the same case may be related to some theoretical proposition’’. (Yin, 2003, 25)

Further discussion and analysis of the data obtained during the data collection process would be discussed in the next chapter.

3. DISCUSSION AND ANALYSIS

The previous chapters have addressed the intention behind the research, relevant theory and the methodological approach used to address the central research question - How can one country learn from the other in order to reduce or prevent stockout of antibiotics in the retail pharmacy settings of England and Nigeria?

After relevant data has been gathered from respondents during the interview, the next and crucial step is to analyse the information gathered in other to come up with a relevant summary and interpretation based on the topic under investigation. This is an important step in doing case study research. (Hancock & Algozzine, 2016)

From the CRQ, three objectives were created, and each objective was further broken down to specific questions aimed at providing better understanding from the respondent. For each point under the objectives, subquestions were generated for the respondents to provide their opinion based on their experience in their respective place of practice. A sample of the interview questions is available in the appendix.

In this chapter, we would therefore proceed to use content analysis of themes that reoccur in the conversations and discuss the outcome for each objective in details based on the responses of participants to each of the questions. The use of themes is more useful than using word count analysis. It simply means looking out for recurring sentences or strings of words in the data available. It is beneficial in research either by counting the number of times the theme occurs or by pointing out an example in the section analysis. (Hancock & Algozzine, 2016) Recurring themes will be highlighted in each section of discussion of the objectives, focusing only on information relevant to the objectives.

To provide answers to the CRQ of this research, thematically analysing the information provided by the respondents and further discussions on the objectives pointed out in the first chapter will help to correlate it with the theory. To better understand who provided highlighted responses, codes would be given to each participant based on their place of practice either independent pharmacy type (ind), small chain (sc) or large chain pharmacy types (lc). The country and years of practice will also be included to the identification code. For example, NG1ind2 signifies the first respondent from a Nigerian independent retail pharmacy with two years of practice experience.

UK1sc4 means the information is from the first respondent in England, from a small chain retail pharmacy with four years practice experience. (Morton et al., 2015)

3.1. Identifying the typical distribution network for antibiotics

Distribution of medication in the pharmaceutical sector involes the movement of drugs from the manufacturer to the wholesaler (distributor) then to the retailer. The process varies slightly in some countries especially in cases where the drugs are not manufactured locally. To understand the typical distribution network for antibiotics in both countries, some questions were asked to the respondents to uncover this. Based on their answers, the following was deduced:

In Nigeria, pharmacies tend to operate a flexible system of business with distributors. Ususally they have a key supplier that they go to for most of their antibiotic needs however, the tendency to have more than one source of supply for antibiotics is high.

> *... "we tend not to stick to a single supplier or distributor, but our major distributor is Add More Pharmaceuticals Mushin but we also source from new heights, SAbis in Oshodi and there are several like Med serve, Drugstore so it's kind of flexible"...NG1ind2*

Despite the flexibility, most retail outlets tend to have one main wholesaler that they call on for their antibiotic needs and in situations where that supplier does not have the drugs available then they switch to another source. Sources where most pharmacies get their antibiotics from include:

WWCVL (World Wide Commercial Venture Limited)- it is one of the largest licenced distributor of antibiotics and other medication for multinational companies in Nigeria. They get their supplies dirctly from multinational pharmaceutical companies and sell into the Nigerian market. They also handle disribution for some local maufacturing companies. They distribute anitibiotics either dirctly to the pharmacies or supply to other wholesalers in the country where retail pharmacies go to meet their antibiotic needs.

> *... "we get from WWCV and we get form some major suppliers like some people that are around us in case we couldn't get the reps on time. So, we have New height pharmacy, we have Medmark"...NG3ind2*

Wholesalers - They mostly get their supplies from WWCVL for multinational drugs while locally manufactured drugs are some times supplied to them directly from the company, depending on the contract. However, most of the time, they depend on WWCVL. There are over two hundred wholesale outlets in Nigeria and more than two thousand in the UK.

> ... *"we get supply from our registered wholesalers in Nigeria, that's majorly how we get. Some we get directly form the company, the pharmaceutical company representatives"...NG5sc10*

Medical and Sales representatives from companies that manufacture antibiotics in Nigeria also promote sales to local retail pharmacies. Local manufactures promote sales of their antibiotics by disbursing stock to their representatives who go and make supplies to places where orders have been sent in for these products.

The diagrammatic representation of the distribution network can be seen below.

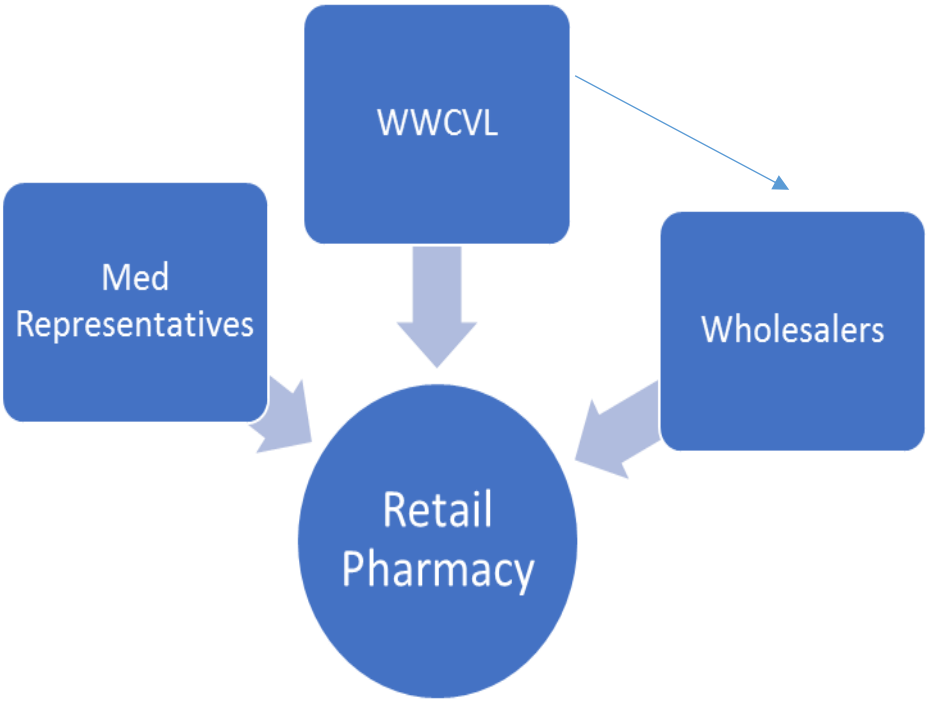

Figure 2. Diagrammatic representation of distribution network for retail pharmacies in Nigeria
Source: Okoh (2019, 29), author's diagram

In England, the distribution of antibiotics to retail pharmacies depend more on wholesalers rather than any other source of supply. The wholesalers have a contract with manufacturing companies for anitibiotics produced locally or those produced form outside the country. Therefore, the supply

of drugs to retail outlets is handled soley by wholesalers which the retail pharmacy has a contract with and in turn they are given a software by the wholesaler.

> *... "when we get prescriptions, we order from them directly, but they are what we call wholesalers, they buy directly from the manufacturers, so they are the middlemen between us and the manufacturers".... UK1sc4*

Different outlets have contracts with more than one wholesaler, sometime up to four wholesalers at a time so that in a situation where the drug is unavailable from their key distributor, they can easily switch to the next available source.

> *... "Generally, in the UK or in community pharmacies we try to keep minimum three to four distributors, so we have an account with three to four distributors. Our three main ones are Phoenix, Unichem and AAH"...UK2ind10*

It was also indicated from most of the conversations that the pharmacies tend to have a main supplier where they get most of their drugs from which is due to the better rates they enjoy for such contracts. However, they still need to have back up supply sources. The software already installed enables the retail outlet to check the availability of antibiotics at the wholesalers' end, this makes it a lot easier to switch to an alternative suppler.

> *..."our main supplier, the reason we call them out main supplier is because we have the best discount based on volume so as long as we hit a certain threshold of spend with them" ..."we have an automatic piece of software that will send it to all of our suppliers and we have 4 different suppliers"...UK3lc3*

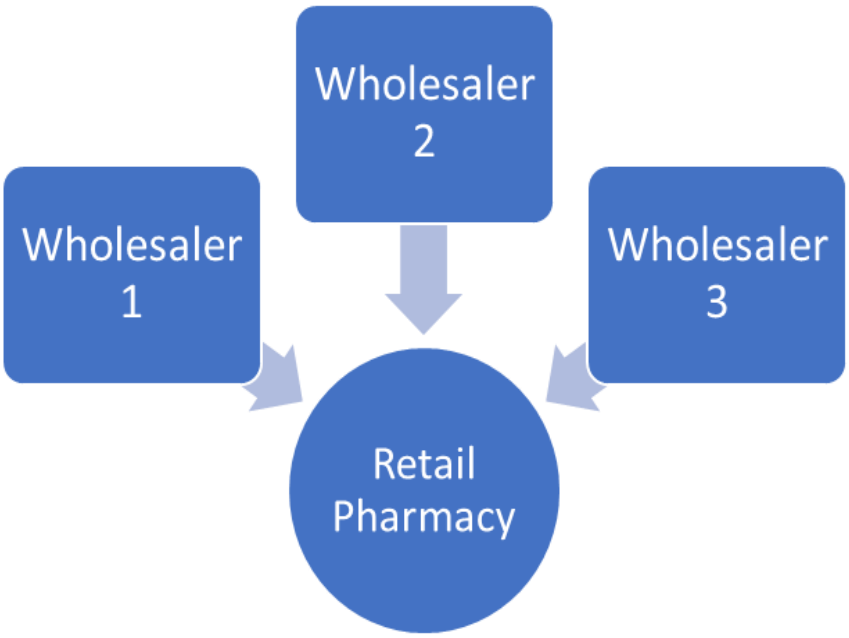

Figure 3. Diagrammatic representation of distribution network for retail pharmacies in England
Source: Okoh (2019, 31), author's diagram

From the information gathered in both countries, it is noted that the need for a relationship to exist between the retailers and the supplier is important. According to Chen & Paulraj in 2004, the increasing trend in globalization has resulted in increased networking between suppliers and retailers. We can therefore see here that the theory of SCRQ is essential for smooth running of activities in the retail pharmacy supply chain.

Since most of the antibiotic needs on the retail end can be met by wholesalers, it was noted from the interview that there was no need for them to place requests for any antibiotics from outside the country themselves. Cases where special antibiotics are required, its usually purchased by sending the order to the wholesaler who then contacts relevant manufactures within or outside the country.

3.2. Supply chain cost structure and on shelf availability

The aim of the second objective is to understand the cost structure as regards stocking in the retail pharmacy as well as to get better insight into the pattern of avaliability of antibiotics on the shelf for both countries.

On discussing with respondents regarding this point, some of the questions addressed were related to identifying the antibiotics commonly sold, frequency of stocking, cost implication attached to getting the drugs supplied, if there are cases of stock out and their causes, how the pharmacy handles stocking in case there is an outbreack that requires them to stock up on a higher quantity of drugs than they normally would.

From the information provided by respondents in Nigeria, the following insights were deduced. First, the antibiotics commonly prescribed amongst all the retail outlets are penicillin based including amoxicillin, ampicillin and cloxacillin. Others are cephalosporins, coamoxiclav and quinolones; their use varies between the different pharmacies. The prices of these drugs vary but the general infomation shows that they are relatively affordable depending on the brand (price ranges from N900 - N4200). Patients have to pay for the full cost of their medictaions, there are no subsidies offered by the government on cost of healthcare.

> *... "well for children, 2500-4000Naira I think the highest of them that's Augmentin ES then for the cephalosporins, 1500- 4200Naira.... NG3ind2*

Most of the pharmacies noted that they have cases of stock out of antibiotics occurring rarely. This can be attributed to the fact that antibiotics are fast moving drugs in Nigerian community pharmacies so if it is unavailable, it can result in the loss of sales which is bad for business. When asked about the frequency of stockout of antibiotics, here was the response from one of the pharmacy managers:

> *… "Not frequent… well why would it be, then I'm out of business"... NG2ind4*

In order to prevent loss of antibiotic sales, they commonly tend to offer an alternative brand to the customer if the specific brand requested is not available but there is one within the pharmacy that has the same active ingredient although its produced by a different manufacturer. This helps to ensure that they do not loose sales and the customer can also leave the pharmacy satisfied.

> *... "for any reason, if we don't have it available, we give alternative, another-generic of it… NG5sc10*

Orders are made to refill stock levels in varying ways. Some send their orders via emails, SMS or by making a call to the supplier. The items are then supplied to the pharmacy either by the wholesaler or whichever source they request from. This is usually at no additional cost.

> *... "we order over the internet; send a mail of the quantity we want. It's in both ways, most of the time they deliver to us here and in most cases, we do go when there is an emergency"... NG4ind3*

Sometimes, the pharmacy must go and pick up the items themselves from the supplier which attracts some transportation cost. Although they noted that the cost is not too significant as to affect their profitability.

> *... "most times they bring it. If we can't wait for them, we go and pick it up... Definitely, it will impact on our expenses, that's operating cost"... NG5sc10*

For cases where the pharmacy needs to increase the quantity of antibiotics to be purchased at a time, such as if there an outbreak of infections and they need to increase stock significantly, it was noted that they do not require special funds to achieve this. Rather, they just increase the quantity of items to be ordered from the supplier and pay later. They mostly run a credit system with the distributors where items are supplied and then payment can be made later; sometimes within 14 – 45 days, depending on the supplier. They therefore do not need to set aside reserve funds for situations like this.

> *... "we don't pay cash immediately for products that we buy. We have a credit system that we run with the distributor"...NG6sc3*

England on the other hand, has some similarities with the practice in Nigeria. Based on the information gathered from the respondents, the main antibiotics used in retail pharmacies in England are dependent on the guidelines for treating the presenting infection. The antibiotics include penicillin's which are mainly first line drugs, macrolides and erythromycin. The costs of these medications vary ranging from pennies for Amoxicillin to about 300 GBP for Nitrofurantoin liquid. Healthcare in the UK is generally subsidized because it is funded by the NHS so patients do not have to pay the full amount for their drugs especially when it's under an NHS prescription.

… "In England, we don't charge patients, its free medication but there are criteria as well to get the free prescriptions. Even though the patient is paying for the prescription, we don't charge the whole amount to the patient there is a prescription charge and they pay only 9 Pounds. Even though the drug costs 100 Pounds, the patient is paying only 9 Pounds"… UK2ind10

Stockout very rarely occur here and in cases where it does its usually that a specific brand or SKU is unavailable, so they need to revert to the doctor to change the prescription in other to dispense a generic brand or adjust the dosage in order to meet the required strength. Drugs that are commonly used do not experience stockouts; uncommonly prescribed antibiotics are more likely to be affected.

… "fortunately, we haven't. Not yet, not for antibiotics for others yeah but not for antibiotics. One time we had erythromycin a couple of years ago where we were not able to get one particular strength of the suspension, but we just ordered in a lower strength and doubled up the dose"… UK1ind4

To replenish stock levels, orders are sent to the supplier online. Data is continuously updated through the software based on items dispensed daily so it's easy to note what items are running out and the quantity that needs to be reordered. Suppliers deliver to each pharmacy store two times a day by designated courier services, the pharmacies do not have to go and pick up any items themselves. This is done at no additional cost to the business because all these are factored into the contract terms agreed between the pharmacy management and the supplier.

…"there are couriers, every company has their own courier and that is their drivers that are trained to handle medications…I'm sure that is all part of the contract where they have to take into consideration the cost of delivery petrol and time"… UK4lc2

… "But in the case of general generic antibiotics, there's no charge"…UK3lc3

In a situation where there is an outbreak which results in pharmacies having to increase the quantities of antibiotics needed, it was noted that they do not keep a reserve fund for that rather, the NHS steps in to provide funding. This goes a long way to help reduce pressure for raising capital on the part of the business in such situations.

… "*I doubt that we would need to worry about funding in that situation because truly NHS will cover the cost"…UK3lc3*

From the information provided in both contexts we see that they both try to ensure that they keep their inventory levels for antibiotics well monitored in order to maintain cases of out of stock to the barest minimum. Pharmacies in England have a more efficient way of managing this using software which is provived by the wholesalers.

In alignment with the transaction cost conceptual framework which refers to the cost businesses incur when providing services or offering goods for consumption, the data gathered shows that businesses strive to keep their transaction cost as minimal as possible so that they can remain profitable within their competitive business sphere. (Yousuf, 2017) One of the ways this is achieved is by keeping the cost of transportation of items required for business to little or no significant cost.

Some of the factors that impact the supply chain structure in both countries can be said to include operational cost, cost of delivery from supplier, cost of storing drugs as well as cost of providing free home delivery in special cases where it is required. In addition to these costs, the Nigerian system makes retail pharmacy businesses incur additional costs to the operational cost which includes cost of fuelling generators to provide electricity required to power the outlets, cost of providing their own transportation where needed and additional cost for warehousing as in the case of the large chain pharmacy interviewed which will be discussed further in the next objective.

3.3. Supply chain reliability and resilience situation in both countries

To understand this objective, we would take a closer look at factors that are taken into consideration to ensure that antibiotics are always available at the pharmacy stores and that there is no breach in the supply chain structure. The information provided by the respondents in both countries would help understand the situation better.

In Nigeria, when asked the reason why retailers choose to do business with their chosen wholesalers, several responses were given which include the ability to get their required items at

the right quantities, getting authentic products and securing a structured payment system that is favourable for business.

> *… "When you send your list, you tend to get 60-70% of your request. Your order comes in but the others, sometimes they give you 20 out of 100 so we prefer to send our list to Addmore first"…NG1ind2*

Getting the required number of items from one source is important because it saves the pharmacy the trouble of having to find an alternative source in a situation where the products are unavailable form the main supplier. It also helps for better financial management.

> *…"before now, we do business with about 5-6 wholesalers and we now find out that the structure of payment was affecting our business … decided to streamline to a particular wholesaler that has almost all the stock and the result of that, we were able to negotiate a structured payment where we buy in bulk"… NG5sc10*

Fake and counterfeit drugs is another challenge that is common in Nigeria therefore licenced pharmacy retailers tend to be careful about where they get their supply, ensuring that the wholesalers are chose are those that meet the predefined drug storage standards set by world governing bodies such as WHO and also that these suppliers buy either directly from the manufactures or from a credible source as well. This factor is very important for the reliability of the outlet by consumers.

> *… "I'm not in doubt as to the genuineness of the product I get from them … you walk into these premises, they are adhering to WHO standard for storage, maintenance… so yeah authenticity is the main reason"… NG2ind4*

Quantities of antibiotic available at the retail outlets are checked on a daily or alternate day basis by both physical counting and with the help of software's in all the pharmacies interviewed. Orders are sent to suppliers based on the need of the outlet; which can be done either two or three times a week for independent and small chain outlets. An out of stock list is generated and sent to the supplier who then packages the products and delivers to the pharmacy within about 24-72 hours or sometimes they must go and pick it up from the supplier depending on the agreed terms.

The situation is slightly different for the large chain pharmacy. Considering that they have a bigger number of pharmacies under the same umbrella (about 40 pharmacy outlets under the large chain interviewed), they tend to have an internal structure of ensuring availability of products in all their pharmacies. They operate a warehouse system where they are supplied in bulk from wholesalers and then they distribute themselves to their several branches. Getting the products from the supplier does not cost them however, since they must supply to their different branches, then there is some transportation cost attached to this activity.

> *... "We have a distribution centre, so we send the order to the distributors who then supply to our warehouse, so our warehouse is the one responsible for distributing the antibiotics to our pharmacies"... NG6lc3*

The large chain pharmacy operates on a forecast system, they can place their orders in advance to distributors once a month. Unlike the indepentents, small chain and large chain pharmacies noted that they maintain a minimum stock level; which is a point to which the stock falls to that requires refilling at each of the branches under the chain. This way they can keep track accurately on the items that are almost running out thereby ensuring the reliability in the supply chain.

> *... "we run a system that checks the minimum and maximum so most of our pharmacy stores get replenishment every day... We have a forecast system which we run every month in the central store, ... it takes care of the things that we need for 45days"... NG6lc3*

Generally, pharmacies have a mini store to stock up on items that are frequently dispensed, but the independent pharmacies tend to rely more on Just in Time system of inventory management in order to save storage cost. The large chain on the other hand, maintains a warehouse from which they distribute daily to all the branches under the company name.

Product expiry is another factor that can lead to the product being out of stock, this was noted to be a rear occurrence with antibiotics and in cases where it occurs, its usually with medications that are not commonly prescribed.

> *... "even if at all, it most likely might be the molecule that is not well known... it's for the rare antibiotics because we sell a lot of antibiotics"...NG5sc10*

Expiry is also prevented by ensuring that products with longer expiry dates are dispensed only after the short-dated ones are finished, thereby adopting First to Expire First Out (FEFO) type of inventory management.

> *... "First to expire is the most recent for adequate resource management, we don't do FIFO anymore, its FEFO"... NG2ind4*

The situation in England retail pharmacies varies in certain ways. The key reason given by all the respondents interviewed, for maintaining the relationship they have with their key suppliers is that they offer them the best rates. Its therefore the obligation of the suppliers to ensure that they keep to the terms of contract and make deliveries daily as agreed or they risk losing the business from that pharmacy.

> *... "In England, it's all about service…it's about them providing a service to me… because they are always other companies out there looking for my business… but I'm always on the lookout for a better deal. As long as they can maintain a good service to me in terms of delivery time and stock availability then that's ok with me…Uk3lc3*

Orders are sent two times daily, which is the turnaround time for all pharmacies. Deliveries are made by courier provided by the supplier to each retail pharmacy two times daily. Each outlet has a cut off time i.e. times during the day when their orders get delivered e.g. at 11am, 2pm, 5.30pm etc.

> *..." the turnaround time is half a day, we order twice a day… once we send the order in the morning we'll get it in the afternoon and the afternoon ones we send it and we get it in the following morning and it rotates in that manner everyday"... UK1sc4*

Pharmacies usually have more than one supplier. With the help of the software, they are able to see the stock levels and avaliability of the products at the suppliers end so its easy to send their order to another supplier almost immediately in a case where the product is unavaliable from one distributor. This saves them the trouble of having to wait till the products are delivered before the pharmacy gets to know that the supplier does not have what they requested in stock. There is a high level of interdependence between the retailer and the supplier for smooth operations to be achieved at the retail end.

… "we can check here and see what sort of stock level the warehouse has… that is done by a colour system. So green means that they have it in abundance, its available, and I think red means it's not available and I think that the amber in between means it is low in stock but if its blue that means it comes from a different warehouse so that normally takes about 3 days to come…UK4lc2

Retail pharmacies in England are highly dependent on the software system which is provided by the supplier, it makes inventory management a lot easier. Stock check is done daily with the aid of the software to know the quantity of items dispensed and what is remaining on the shelf. A minimum stock level is maintained in all outlets, as soon as the quantity falls below this, the software automaically updates the quantity of items needed and its sent to the supplier based on the cut off time.

… "it's the software system that we use. It tells us everything, how much stock I've got so I set up… So, my stock is 5, minimum 5 so if it drops to 4, it tops up automatically and it transmits to my supplier"...UK2ind10

Just in Time system of inventory management is used in all the pharmacies. Since they can easily get supplied what is needed on a twice a day basis, there is no need to maintain internal storage. Expiry occurs rarely, and its mostly for products that are rearly used. In cases where the product is not avaliable when needed by patients, the pharmacy first looks at the possibility of changing the prescription. They contact the GP to request this although it might take some time to get it done. The alternative to this is either to request that the patient checks another pharmacy store or if they are willing to wait, they can order it and then deliver to the patients at home.

… "they'll either be annoyed, or they will generally understand that they've got to come back… I see they are suffering; I'll recommend they go somewhere else just to get it … we'll also deliver the medication to them if they are really unwell, mostly they'll leave it with us then go home, we'll deliver it to you"... UK3lc3

From this we see that there is some level of interdependence between the retail and wholesale outlet to ensure reliability in the avaliability of antibiotics at the retail pharmacy end. It is in line with the SCRQ according to Atrek et al. in 2014, interdependence is noted as one of its essential

components which has a positive and profitable impact on the quality of the supply chain performance (Vorst et al., 1998).

Stock out can be due to in-store or out of store causes but ability of the outlets to quickly recover in cases of unavailbity refers to its rescilience and it can be seen that in both countries, they try to maintain more than one supplier to make room for such events. The use of software in England is however better utilized as it enhances better coordination within the supply chain.

3.4. Understanding the performance gaps - how one system can learn from and realistically apply the practice to the other

In Nigeria, some of the factors that lead to gaps in the performance of the retail pharmacy supply chain include:

- Insufficient capital: when a pharmacy is unable to raise funds to pay for a previous supply, it would be impossible to get new stock from the supplier.
- Ineffectiveness of relevant staff in updating the list of items that are running low in quantity or those that are close to expire
- Stocking up on antibiotic molecules that are not commonly prescribed

It was generally noted that wholesalers have a part to play when it comes to antibiotics being out of stock. There are times when the retailer requests for a certain quantity of products but the wholesaler is only able to supply less than 60% of the demand. These type of cases result in shortage on the retail end as well.

> *... "suppliers are usually always there so if they don't have the stock then we will definitely be affected"... NG2ind2*

Technology has a relevant role to play in inventory management because it makes the work easier. The use software system was mentioned at all the pharmacies interviewed in Nigeria however, compared to its use in the UK, there is room for better efficiency with its use. Software is used to track inventory levels but other things like getting the out of stock list and transmitting to the supplier are done manually in most outlets. It is also currently not possible for retailers to know the availability of products at the wholesaler end because there is no synchronisation in that area.

…"It has made it actually very easy in the sense that anywhere in the world I am, I can actually access my system because we use a UK software called APUSLam and it can be downloaded on any android and I phone and we can access the stock level"…NG5sc10

Despite the issues, all the respondents noted that they currently have good control over their stocking especially for antibiotics. As a way of improvement, some key factors mentioned include: ensuring that two or three brands of each antibiotic molecule is available (necessary for brand switching), upgrading software for better inventory management, having dedicated and motivated staff members who check stock levels regularly and better synchronisation with wholesalers.

… "I would like to borrow a leaf from what is obtainable in the UK where we have a common software… like a system that can synchronise with the wholesale software"… NG5sc10

In England, the wholesaler end was noted as one of the factors that results in gaps within the supply chain. The products can be available from the manufacturer but the wholesaler may be unwilling to pay a certain amount to hold products which can lead to scarcity. Also, issues might arise from the manufacturers end such as product recall or cases where the patency of the product has expired resulting in it being unavailable.

… "*I believe it's not the manufacturers it's the suppliers. They don't want to pay a certain amount, so they don't hold it in stock, or they don't pay the bills to the manufactures and the manufactures withhold stock"… UK1sc4*

The problem of stock unavailability can be considered as an issue that is primarily from the suppliers end as against the retailers end because there is very good synchronisation between retail and wholesalers and orders are generated and sent frequently. Another factor is the doctor's prescribing pattern. Guidelines are generally followed when it comes to prescribing antibiotics hence, in a situation where a new doctor is posted to the surrounding hospital and decides to prescribe something that is not commonly used based on guidelines, it can result in a situation where the pharmacy will not have it available for the patient as at the time it is needed.

Technology plays a vital role in the supply chain system in England, making the job easier and reliable. The software notifies when the items have fallen below minimum stock level and places

an order to refill. The person in charge then checks it and clicks on the send button which automatically transmits the request to the supplier. It is also possible to see the stock availability at the supplier's end, maintaining a level of transparency in this phase of the supply chain. This impact of technology at the retail front is in line with the ideology of Småros et. al in 2003.

> *... "it's made life a 100 times easier ... this software now I just press one button and it's gone straight to the supplier and its saved hours, days of time over the years"... UK3lc3*

The current supply chain process for stocking antibiotics in England is generally stated to be very efficient, pharmacies rarely experience stock out of antibiotics. However, as a way of improvement, it was noted that transparency is required on the part of the wholesalers, by informing in advance when they are experiencing a shortage of certain items. The pharmacy on their part also need to be more in tune with the local community so that when they observe an increase in prescription for antibacterial medications, they can prepare themselves by increasing the quantity of items they order. One of the respondents indicated that advancement in technology such as the use of Artificial Intelligence (AI) can also be beneficial to the supply chain process.

> … "*I think they can go a lot of a long way by utilizing the technologies we have the A.I"...UK4lc2*

Brexit was noted as a factor of concern for stockout in retail outlets considering that there are uncertainties as to how the process will play out and the impact it will have on trade with the EU. It was expressed that there are currently some challenges in the supply of some other medications although antibiotics have no issues at this time.

> *... "but these days presently we are experiencing problems with the stocks available in England market because of something related to Brexit so as of now we are ok…UK2ind10*

From this analysis, as a way of learning, there is clear indication that both systems do their best to ensure that stock out of antibiotics is prevented. England has a more efficient way of ensuring this by leveraging on technology, the supply chain system is properly synchronised between the retail and wholesale end. With this, the cases of antibiotics being out of stock do not arise from the retail pharmacy point rather from the wholesaler or manufacturer end unlike the Nigerian system where

there are a few lapses on the retail pharmacy end. Therefore, more efficient use of technology will help improve the quality of the supply chain ensuring its reliability and ability to adapt to changes.

CONCLUSION

In the previous chapters, we have looked that different areas that help us understand the situations related to stocking of antibiotics in retail pharmacies in England and Nigeria with the aim of understanding how one system can improve its activies by learning form the other. To draw up the conclusion, we will look at the objectives again.

Identifying the typical distribution network for antibiotics; from the analysis, we can deduce that the distribution network in both countries are slightly different. Some of the themes that stood out include software, capital, minimum stock level, cut off time, turnaround time, and Just-in-Time inventory management.

In Nigeria, there is WWCVL, other wholesalers and medical representatives from pharmaceutical companies who participate in the distribution of antibiotics while in England, the supplies mainly come from wholesalers who in turn get their stock directly from manufacturers and service retail outlets. In both countries, it is noted that they maintain two or three sources of supply at a time to avoid disappointment.

Supply chain cost structure and on-shelf availability: in Nigeria, procurement of antibiotics is done on credit basis from suppliers and they can make payment within the agreed number of days. Cost of doing business is high because businesses must factor in cost of powering the outlet, other operational cost as well as cost of storage and transportation to their outlets particularly for large chain pharmacies. In England, the cost entailed mainly has to do with operational costs, procurement of product is done based on the contractual agreement between the outlet and the wholesaler. In both countries, Penicillin's and its derivatives are commonly used which is based on laid down guidelines of antibiotic use. Brand switching is practiced where customers are given a generic brand when the specific brand requested is unavailable so patients can always leave with something. Pharmacies ensure that they always have products available and send their orders as needed. This process is more frequent and efficiently done in England pharmacies. Providing better

infrastructures such as power and better road network by the Nigerian government, would go a long way to reduce the additional cost incurred to run a business in Nigeria.

Supply chain reliability and supply chain resilience situation in both countries: to ensure reliability in the supply chain, retail pharmacies in Nigeria endeavour to do business with wholesalers that they are sure would have a higher percentage of the items requested. They maintain an out of stock list which is sent via email, SMS or phone call to the supplier two or three times a week hence they get supplied that way as well. Items are sometimes delivered to the outlets but many times they need to go and pick it up themselves from the supplier. In England on the other hand, there is better consistency in generating and sending orders to wholesalers. A minimum stock level is maintained for each item, when it falls below this level, a reorder is triggered on the system. The software system helps to make the work easier; orders are sent twice daily to the supplier and deliveries are made by suppliers based on the cut off times in the morning and afternoon for all pharmacies. This encourages the Just-in-Time system of inventory management.

In case the antibiotic needed is unavailable with the wholesaler, Nigerian pharmacies can source of alternative supplier quickly, but this information might only be known after the delivery has been fulfilled and the quantity of items supplied are seen to be less than what was requested. The situation is better handled in England, retailers can see the stock levels available at the wholesalers end immediately (before placing the order) via the software so they can easily send the order to another supplier when it is indicated that one wholesaler is out of stock on that item. These are some of the indications of a better resilience situation in England which can be adopted by Nigeria.

The impact of technology in improving supply chain process cannot be over emphasised. Pharmacies in Nigeria are adopting the use of software's that help make their inventory management process smoother but there is no synchronisation with the suppliers which is a gap in the process. Pharmacies in England have optimized the use of software's in their day to day activities through the synchronisation of inventory data with that of the wholesale end, which makes the supply chain more reliable.

Therefore, there are a few lessons that can be adopted from the practice in England to what operates in Nigeria, to result in a more improved supply chain structure both for antibiotics and other medications.

Further studies can be done on understanding the impact of Brexit on the supply chain system in retail pharmacy stores in Britain, this was raised as a concern by some of the respondents from England. Although, it was hinted that antibiotics currently have no issues but some other medications are experiencing some challenges due to the upcoming Brexit so there are some uncertainties as to what to expect going forward.

In Estonia, it was announced recently that over 10% of drugs are at critical levels, mainly as result of activities from the dristributors. The current distribution set up has only two players hence, further study can be carried out to uncover the impact of changing the setup from oligopoly to a more flexible system, incoporating other players into the national drug distribution system. Further research can also be done to uncover the possibility of making the retail pharmacy supply chain leaner by eliminating the middlemen (wholesalers /distributors).

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APPENDICES

Appendix 1. Letter of introduction for interview with respondents

Ehitajate Tee 5
19086 Tallinn, Estonia
Email info@taltech.ee
www.taltech.ee
22.02.2019

Dear Sir/Ma,

Request to participate in an interview for MBA Master Thesis Research

My name is Unoamaka Okoh, a student of Tallinn University of Technology (TalTech) in Tallinn Estonia and I am studying for my master's degree in International Business Administration (MBA). I am in my final semester of the programme and currently writing my master thesis on the topic: - **Retail Pharmacy supply chain performance - a comparison of typical configurations of England and Nigeria**.

My first degree is in pharmacy and I had practiced for a few years in Nigeria as a pharmacist which is my motivation for doing my thesis on this topic, in other to understand how the procurement system works in both societies especially with regards to managing stockouts of antibiotics and to see how one system can learn from the other.

Therefore, I would appreciate a few minutes to have a brief semi structured interview based on questions related to how you manage procurement of antibiotics to help me with my project.

Thank you.

Yours Sincerely,

Unoamaka Okoh

Interview questions for qualitative research on Retail Pharmacy supply chain performance - a comparison of typical configurations of England and Nigeria

Research question

The research question which is to be addressed is: How can one country learn from the other on how to reduce or prevent stockout of antibiotics in the retail pharmacy setting?

Identifying the typical distribution network for antibiotics

- *How do you source for antibiotics (central depo or distribution store)?*
- *Do you have key suppliers? (please be specific)*
- *Do you source for antibiotics from other distributors /sources apart from your key supplier?*
- *Have you had to source for antibiotics from outside your country?*

Supply chain cost structure and on-shelf availability

- *What is the main class of antibiotics that patients come to buy? (How much does it cost)*
- *Do you experience stock out of antibiotics? How frequently (weekly or monthly)?*
- *How frequently do you have to make orders to refill stock levels?*
- *How do you get your supplies across to your pharmacy?*
- *Do you incur additional cost when antibiotics are supplied to you from your suppliers such as transportation cost?*
- *If this cost is eliminated do you think it will impact your profit margin significantly?*
- *How do customers react when the antibiotics they need are out of stock?*
- *Do you incur additional costs when you have to deliver the drugs to patients?*
- *How do you ensure that antibiotics are available on your shelf all year round?*
- *In a case where there is an outbreak of infections that require you to purchase a higher quantity of antibiotics, does your organisation set apart 'reserve funds' for such incidences?*

Supply chain reliability and supply chain resilience situation in both cases of Nigeria and UK

- *Why do you maintain your relationship with your key supplier?*
- *How long does it take for an order/ requisition to be supplied and made available on the shelf? Do you consider that as fast delivery?*
- *How quickly do your suppliers respond to your requisition?*

- *In a case where the drugs are not available from your key supplier, how quickly are you able to find an alternative supplier?*
- *Do you have cases where antibiotics expire on the shelf?*
- *How often does this happen monthly?*
- *Do you have a store within the pharmacy or adopt just-in-time system?*
- *What method do you adopt in the inventory management for antibiotics (taking stock)?*
- *How frequently do you take stock (daily, weekly, monthly)?*

Identifying the performance gaps - how one system can learn from and realistically apply the practice from another

- *In your opinion how well do you think you are able to manage your stock level for antibiotics to ensure that you don't go out of stock?*
- *What factors do you think are responsible for antibiotics going out of stock?*
- *Do you think the wholesalers have a part to play in this problem?*
- *How has technology influenced your requisition systems- are there soft wares you leverage to help notify when you are running low on antibiotics*
- *How would you suggest that you can maintain or improve the level of antibiotics available in your pharmacy?*

Appendix 2. Sample of transcript of interview with respondent in England

Crompton Pharmacy (20 pharmacies in the chain)

Pharm Yusuf (3yrs superintendent)

Pharmacist for 7yrs

Identifying the typical distribution network for antibiotics

- *How do you source for antibiotics (central depo or distribution store)?*

  Ans- from our point of view, we order based on a cascade system so we have an automatic piece of software that will send it to all of our suppliers and we have 4 different suppliers, source it from the cheapest location and then send it to us either once or 2ce a day depending on which supplier it goes to.

- *Do you have key suppliers? (please be specific)*

  Ans- so for example our main supplier, the reason we call them out main supplier is because we have the best discount based on volume so as long as we hit a certain threshold of spend with them, we get certain level of discount and therefore the software we have calculates all of that and will send it to the relevant supplier

- *Do you source for antibiotics from other distributors /sources apart from your key supplier?*

- *Have you had to source for antibiotics from outside your country?*

  Ans- No, we have not had any need to source from outside the country because if it isn't available by our normal cascade system, we can order as a special which is still from a wholesaler in this country. Now if they are sourcing it from abroad, it unlikely because they would make it specially, but I've never had to source it from abroad so far.

Supply chain cost structure and on-shelf availability

- *What is the main class of antibiotics that patients come to buy? (How much does it cost)*

  Ans- yeah mainly penicillin's, but once you go past that first line its generally macrolides, just purely due to allergies mainly, the next set of antibiotics which is your UTi's so your nitrofurantoin, trimethoprim are your most common and I'd say third line then you'll go int co amoxiclavs again penicillin but co amoxiclav is 3rd line and then finally is the skin conditions so we are talking erythromycin, lymecycline, and that basically the bulk of our antibiotics, beyond that they aren't very many.

So there's 2 main indications we see which is generally respiratory, next will be skin for flucloxacillin and then UTI's. beyond that, everything is acute or very small or minor infections, not very in tune but the prescriptions for those antibiotics.

How much? Phenoxy methyl penicillin is 1 or 2 GBP max, its relatively cheap to be honest and the flucloxacillin it's probably less than a pound. Amoxicillin is pennies, it's very cheap, not expensive at all, the trimethoprim and the nitrofurantoin, when they were having stock issues, fluctuated a lot, that went from what was under a pound to almost 14-15GBP a box so that became very expensive. Then it came done and stabilized and its back down to its normal price after a few months. But that did get expensive. When it happened it was rear, but it's gone back so that's not a problem.

- *Do you experience stock out of antibiotics? How frequently (weekly or monthly)?*

  Ans- on occasions it has happened in the past few years the main one was nitrofurantoin and then it was trimethoprim, so it was mainly related to UTI's. we had a brief problem with flucloxacillin a few months ago, other than that, the main line of them have been available throughout my practice.

- *How frequently do you have to make orders to refill stock levels?*

  Ans- I generally do it every day because I'm in a healthcare setting inside a main surgery, mainly get acute prescriptions, mainly people have gone to see the doctor for these reasons. I will make sure I have enough stock every single day.

- *How do you get your supplies across to your pharmacy?*

  Ans- it is delivered 2ce a day to the pharmacy, whatever order I place by 12pm, I will have by the afternoon and whatever I place by 6pm will be delivered to me the next day.

- *Do you incur additional cost when antibiotics are supplied to you from your suppliers such as transportation cost?*

  Ans- No

- *If this cost is eliminated do you think it will impact your profit margin significantly?*

  Ans- The only time that there is an additional cost is not related to antibiotics, its only related to special items where you pay a handling charge. But in the case of general generic antibiotics, there's no charge.

- *How do customers react when the antibiotics they need are out of stock?*

  Ans- it very much depends on their situation, for example, the … had a run on amoxicillin all morning and I run out but its coming in the afternoon, depending on how ill the person is, they'll either be annoyed or they will generally understand that they've got to come

back, I always recommend to them, if I see it and I see they are suffering, I'll recommend they go somewhere else just to get it but if its something that I know they'll be fine till afternoon, I will offer that they come back in the afternoon. In drastic cases, we'll also deliver the medication to them if they are really unwell, mostly they'll leave it with us then go home, we'll deliver it to you.

- *Do you incur additional costs when you have to deliver the drugs to patients?*

  Ans- so pharmacies have started to charge, we will not charge, we maintain free service.

- *How do you ensure that antibiotics are available on your shelf all year round?*

  Ans- we keep a minimum level; we have a record on our computer software that allows us to see the minimum daily usage and I always make sure that my stock is at the minimum at that level.

  It will basically mean that I will look at it, depending on what time of day it is, so if I'm at 6pm in the evening and I'm 2 boxes under, it's not really a problem. If it's the morning, I'll make sure I order it so I make sure I have that

- *In a case where there is an outbreak of infections that require you to purchase a higher quantity of antibiotics, does your organisation set apart 'reserve funds' for such incidences?*

  Ans- no, there's never ... I mean how drastic are we talking or you are talking, like a pandemic, ok, I mean if that was to ever happen, it would be a nationwide problem and you would unlikely need to be cost involved as it will most likely be NHS funded so, I doubt that we would need to worry about funding in that situation because truly NHS will cover the cost.

Supply chain reliability and supply chain resilience situation in both cases of Nigeria and UK

- *Why do you maintain your relationship with your key supplier?*

  Ans- its less about maintenance of a relationship with them. In England, it's all about service, so as long as we say we will hit a threshold, it's about them providing a service to me. I don't need to maintain that relationship; they need to maintain it with me because they are always other companies out there looking for my business. so, I'll hit my spend because I already do that anyway with them, but I'm always on the lookout for a better deal. As long as they can maintain a good service to me in terms of delivery time and stock availability then that's ok with me but in this country, they have to maintain relationship with me to make sure I keep ... to make sure they keep my business.

If you are a single entity, a single pharmacy, they yes you need to maintain that relationship with them, spend well with them to keep the discounts low.,. But when you are part of a group which is what we are here, we have a group of pharmacies, therefore the spend is higher, there its more valuable to them, therefore they have to maintain the relationship with you cos you could take that and go elsewhere and it would be detrimental to them. As a single entity, it would be up to me but I'm part of a group.

How many pharmacies are in the group- so there's a group of about 20 pharmacies together so on average, we spend about between 15 and 20k GBP per day with this so they have to maintain that with us cos that's a lot of money.

- *How long does it take for an order/ requisition to be supplied and made available on the shelf? Do you consider that as fast delivery?*

  Ans- for example, if a patient comes at 9am in the morning and I've ordered it, as long as I have ordered by 12noon, I'll get that in the afternoon, so my first order delivery arrives around 2pm, I have a second one around 4pm and another at 6pm from different suppliers. Each one does 2ce a day but those are the times delivered so depending on who's coming first, I can have ready as early as 2,4 or even 6pm.
- *How quickly do your suppliers respond to your requisition?*
- *In a case where the drugs are not available from your key supplier, how quickly are you able to find an alternative supplier?*

  Ans- we would address it based on the formulary and NICE guidelines of the country and then take it to the prescriber to prescribe an alternative which hopefully we have in stock if not we then order that, hopefully the turnaround is less than 24hrs depending on how busy the doctors are. If not, max 48hrs.
- *Do you have cases where antibiotics expire on the shelf?*

  Ans- Not antibiotics, No, cos the turnaround is so much that we are unlikely to get ones that go out of date.
- *How often does this happen monthly?*
- *Do you have a store within the pharmacy or adopt just-in-time system?*

  Ans- when the suppler gets it to you that's when you have it on your shelf- Yes – exactly
- *What method do you adopt in the inventory management for antibiotics (taking stock)?*

Ans- Quantity- that, we don't really do that from our own point of view, the only time it's done I for our accounts, to check what our inventory is once a year, to check our stock taking. Its… you get used to what you have the more you work in a place and therefore you get used to the quantities of what you should need and things like that. So, again I'll only keep it as much as my daily usage generally.

Yeah, if I'm honest, the more you work in a place, the more you know the figure and its less about the number and what you can see based on the shelf. If I see its stacked up to the top, I know that's enough, if I see its halfway down, I know I need to order more. Its less about the physical quantity and more about what I can see visually. I don't spend my time counting the box, I just rather see it and from experience I know that it needs to be refilled

- *How frequently do you take stock (daily, weekly, monthly)?*

  Ans-

Identifying the performance gaps and how one system can learn from and realistically apply the practice from another

- *In your opinion how well do you think you are able to manage your stock level for antibiotics to ensure that you don't go out of stock?*

  Ans- very well, we have a set process in place at certain times of the day when we are getting close to the cut off, we would search through and look at what needs to be ordered including the antibiotics and if they are low then we make sure they are replenished for the afternoon when the second afternoon surgery

- *What factors do you think are responsible for antibiotics going out of stock?*

  Ans- Brexit. Raw ingredient obtainability. But I also think it's a bit of a game between the pharmaceutical companies because I find it hard to believe that a nitrofurantoin could have gone out of stock at the exact same time that trimethoprim went up in price. So, I think there are games between the pharmaceutical companies as well. But also, wholesaler games as well they definitely play games in terms of if they know the prices are going up, they withhold stock just as long as…. Till the time when the price goes high.

- *Do you think the wholesalers have a part to play in this problem?*

  Ans- Yes, most definitely.

- *How has technology influenced your requisition systems- are there soft wares you leverage to help notify when you are running low on antibiotics*

Ans- it's made life a 100 times easier. There was a time 7 years ago where I would have to physically manually go through each supplier for items to check who was cheapest. With the use of this software now I just press one button and it's gone straight to the supplier and its saved hours, days of time over the years. We've had this software for like 18 months now and its saving me countless hours a day.

- *How would you suggest that you can maintain or improve the level of antibiotics available in your pharmacy?*

  Ans- it's a difficult question there because I don't think I can …. The only other way I can improve it is by somehow getting hold of GP data to find out if they have some sort days... so what was prescribed on certain days, certain periods of the year, in winter, things like that, could maybe help me hold more efficient stock but I think in terms of the process we have now, it's more than enough. I can't remember a time where I run out of antibiotics because in the setting we are in, we hold that as a priority to ensure we have enough. This includes tablets and liquids.

Appendix 3. Sample of transcript of interview with respondent in Nigeria

Delightsome Pharmacy

Pharm George (Superintendent pharmacist)

Owner and procurement manager

5 outlets

Identifying the typical distribution network for antibiotics

- *How do you source for antibiotics (central depo or distribution store)?*

  Ans- Basically, antibiotics are .. we get supply from our registered wholesalers in Nigeria, that's majorly how we get. Some we get directly form the company, the pharmaceutical company representative.

- *Do you have key suppliers? (please be specific)*

  Ans- Definitely, we use a particular wholesaler for about 80% of our supplies

- *Do you source for antibiotics from other distributors /sources apart from your key supplier?*

  Ans- Yeah, like I said, we can source from other wholesalers and with the company representative basically.

- *Have you had to source for antibiotics from outside your country?*

  Ans- Yes, some cases … I don't do it directly any way. I leave that for the wholesaler, I send them my requisition and if its not available in Nigeria, they source for it from wholesalers in the UK

Supply chain cost structure and on-shelf availability

- *What is the main class of antibiotics that patients come to buy? (How much does it cost)*

  Ans- Basically, the most common that they come to buy is Ampiclox by Beecham- Price 900 per sachet of 10 capsules

- *Do you experience stock out of antibiotics? How frequently (weekly or monthly)?*

  Ans- we try not to stock out but basically its readily available from the importer that's from the company itself.

  (for any reason if the pharmacy does not have it available, how do they manage that in the pharmacy?) Ans- for any reason, if we don't have it available, we give alternative, another-generic of it

  How Frequently does this happen- rarely

- *How frequently do you have to make orders to refill stock levels?*

  Ans – we do every 2 days (every other day)

- *How do you get your supplies across to your pharmacy?*

  Ans- sometimes we do, most times they bring it. If we cant wait for them, we go and pick it up.

- *Do you incur additional cost when antibiotics are supplied to you from your suppliers such as transportation cost?*

  Ans- Yes. to us

- *If this cost is eliminated do you think it will impact your profit margin significantly?*

  Ans- Definitely, it will impact on our expenses, that's operating cost, cost of fuelling. (is the cost significant) Not necessarily because we use our own vehicle….part of operating cost.

- *How do customers react when the antibiotics they need are out of stock?*

  Ans- Yes in most cases they get so disappointed when we don't have it and for us it.. we also feel disappointed too for not having it available for them so we try as much as possible to make sure that we have most of what they ask for.

- *Do you incur additional costs when you have to deliver the drugs to patients?*

  Ans- no it doesn't – the customer does not pay extra for it.

- *How do you ensure that antibiotics are available on your shelf all year round?*

  Ans- Basically what we do is that we have a software that gives us the stock level just like what I was doing right now is checking our stock level, so from the stock level we know when to place order, so that's what we are doing. So, when we confirm from the shelf, we check from the stock to know if we still have more in the store so that would actually help us to know if we are running low.

- *In a case where there is an outbreak of infections that require you to purchase a higher quantity of antibiotics, does your organisation set apart 'reserve funds' for such incidences?*

  Ans- No, there is no such funds anyway but what happens is basically, when we go into alliance with a particular wholesaler, just like what I told you, most our stock (almost 80%) comes from a particular wholesaler so we've been able to form that relationship where we get stock on credit and we pay later.

Supply chain reliability and supply chain resilience situation in both cases of Nigeria and UK

- *Why do you maintain your relationship with your key supplier?*

  Ans- Because before now, we do business with about five to six wholesalers and we now find out that the structure of payment was affecting our business. When if we want to pay the five or six wholesalers that we do businesses with , so we had a management meeting

and decided to streamline to a particular wholesaler that has almost all the stock and the result of that, we were able to negotiate a structured payment where we buy in bulk so that has so far payed off.

- *How long does it take for an order/ requisition to be supplied and made available on the shelf? Do you consider that as fast delivery?*

  Ans- Basically, for this particular wholesaler, they have the days they deliver to the Island, but they are majorly on the mainland, so they come to the Island on Mondays, Wednesday and Thursdays. So, if we place our order on the weekend, they would get supplied on Monday. If we place on Tuesday or if we place on Monday, we get suppled on Wednesday, so that's how it works.

  The time duration- in most cases, that's why when... like I told you we buy every other day so as a result of that, sometimes we don't wait for them so that we don't have that gap in other to meet the needs of our customers.

- *How quickly do your suppliers respond to your requisition?*
- *In a case where the drugs are not available from your key supplier, how quickly are you able to find an alternative supplier?*

  Ans- We have other wholesalers we buy from. Not that we don't buy from them but what they don't have, we source it from the others.

- *Do you have cases where antibiotics expire on the shelf?*

  Ans- even if at all, it most likely might be the molecule that is not well known because in most cases, what we try to do is to stock all the molecules that we know for different ailments but it's rare basically. Except it's for the rare antibiotics because we sell a lot of antibiotics.

- *How often does this happen monthly?*
- *Do you have a store within the pharmacy or adopt just-in-time system?*

  Ans- it's actually a just in time system for now. Hopefully we tend to expand and when we expand, we are looking at having an effective store where most things are being worked out from the store before it gets to the pharmacy floor.

- *What method do you adopt in the inventory management for antibiotics (taking stock)?*

  Ans- Both,- Physical and computerised, like when you came in, you saw me walking round to look at what … if I notice any gap, I know what was there and all that so I find out if we still have it, if they say no or if its small, I come back to the system, check what the

stock level is, if I see we have, I tell them to look for it. So we employ both the computerised and the physical.

- *How frequently do you take stock (daily, weekly, monthly)?*

  Ans- Every time we have supplies, almost every day so that we make sure we are on point with our stock. so we don't have…you know traditionally, based on where I was trained, we had a particular time they do stock taking and I found out that that could be very cumbersome so why not do the stock take when you have new supplies. It doesn't take anything any way. What you just have to do is to look at what they have on the shelf, just like we have our requisition order, if they are sending the list to us lets know what they have. Then from the Backoffice, we would now check what it shows on the system so when there is a discrepancy, we would be able to sort that out immediately. We don't need to wait until more stocks have been added to it before we would not be able to trace where the error is coming from.

Identifying the performance gaps and how one system can learn from and realistically apply the practice from another

- *In your opinion how well do you think you are able to manage your stock level for antibiotics to ensure that you don't go out of stock?*

  Ans- so far so good, I have been able to have control over our supplies and what we dispense out. Just like I said earlier, what we do is when we get new inventory, we do the check immediately, we take our stock immediately to know what is happening. Then at the end of the month, from the system we now know the amount of antibiotics based on brands that was been sold, that would also inform our decision on what to order because we tend to order in bulk what can take us for a month.

- *What factors do you think are responsible for antibiotics going out of stock?*

  Ans- Basically the ones that can lead to that are molecules that are not registered in Nigeria for example, cyclin, oxytetracycline, these molecules … I don't know if there is any registered product within Nigeria, so we rely mostly on generics from the UK.

  ***The demand for these drugs occurs rarely so they are bought in anticipation that some people would request for it and sometimes they might not anyway-50:50 chance*

- *Do you think the wholesalers have a part to play in this problem?*

  Ans- yeah Definitely

- *How has technology influenced your requisition system- are there soft wares you leverage to help notify when you are running low on antibiotics*

Ans- It has made it actually very easy in the sense that anywhere in the world I am, I can actually access my system because we use a UK software called APUSLam and it can be downloaded on any android and I phone and we can access the stock level. You can actually log in to know what the sales are in each of the outlets so it's a mobile inventory software where in the world you can access it. So that's the top-notch form compared to the traditional method of using Bin cards and when you are not there, you are not there. Not that the bin card was not efficient anyway, but it takes more time to record and all that unlike the software which basically… I can actually use my phone to do all what I am doing. As I am checking, using my phone or I pad to know what the stock level is and know if it corresponds. And this is definitely more efficient than using bin cards to sort out the stock levels.

- *How would you suggest that you can maintain or improve the level of antibiotics available in your pharmacy?*

  Ans- yes, I would like to borrow a leaf from what is obtainable in the UK where we have a common software, maybe not necessarily a common software but like a system that can synchronise with the whole sale software so that in case we have any stock out, instead of doing it manually, sending your stock manually, you can from your software just send your stock to the wholesalers and when they supply, they send your invoice directly to your software. What would happen is when the goods arrive, you would just need to print it out, cross check if it tallies with what is sent, and you just receive it. So, this takes off so many other burdens of taking out invoices and trying to sort out what you don't have and what you have. From your system you know what is out of stock you don't even need to ask then you send it off directly to the wholesaler. Though, myself and the major wholesaler we do business with, we are talking and looking at the possibility of synchronising systems so as to make it very easy to send the order because the software works with the internet, it's a cloud based software.

Appendix 4. Audio recording of all interviews

Link- https://drive.google.com/open?id=1nd6CgvIfW2EbHJ-sWFwRxv7vAb0LARFP

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