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# Transforming vaccines supply chains in Nigeria ☆

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ABSTRACT

Nigeria is the most populous country in Africa and in 2012 was suffering some of the lowest vaccination rates in the World. A combination of factors had resulted in a dysfunctional immunization cold chain and supply chain. Recognizing that the number of unimmunized children contributed to high levels of under-5-mortality, and that health MDGs would not be attained, Minister of State for Health Mohammed Pate launched a vaccines transformation project in 2013. In partnership with BMGF, GAVI, UNICEF, WHO, other donors and implementing partners the transformation journey has so far taken three years and achieved impressive results. It has though faced challenges along the way and with the financial burden of GAVI graduation facing Nigeria, the economic downturn and the decentralized funding of health services, the results are far from sustained. This paper documents the work undertaken at the Federal level and then highlights specific work undertaken in partnership with Lagos State Government. It identifies the importance of taking an end to end approach and looking at the root causes of weak system performance. The strategy combined simple innovations in how data was captured, recorded and used to drive decision making. It included a comprehensive and systematic approach to cold chain procurement, installation and maintenance with a shift to a culture of active cold chain maintenance that is performing with higher levels of uptime. It also included supply chain redesign at both the Federal and State level. Finally, it involved an institutional transformation at the National Primary Health Care Development Agency (NPHCDA) to establish a data driven Department of Logistics and Health Commodities (DLHC) to manage the many challenges in immunizing 7.5 million children annually. While results have been impressive, there have been many challenges and lessons learned on the way. As Nigeria gets ready for its graduation from GAVI, a robust agile performing cold chain and supply chain will be essential for the good health of Nigeria's children and its economy. The necessary transformation journey has only just begun.


## 1. Introduction

Nigeria's performance in routine immunization has lagged that of its peers. According to WHO WUENIC estimates, in 2012, Nigeria achieved a national DPT coverage rate of 41%, compared to 61% for Ethiopia and over 90% for countries like Ghana, Malawi, Rwanda and Angola. The 2016 GAVI Join Assessment Report, quoted Penta 3 coverage of 56% according to WHO WUENIC estimates although the Official Joint Reporting Form (JRF) reports 74% in 2015 [1]. Differences to the official Administrative data (JRF) of 96% are attributed to challenges with population denominators. The performance of the system at sub-national levels was also similar. An initial performance baseline in Lagos and Kano showed that the magnitude of stock outs or antigens below the minimum level was very high. Between January and May 2013, Local Government Area (LGA) stores in Kano were stocked out more than 80% of the time for most antigens. In Lagos, on average more than 80% of LGA stores were below minimum stock levels during the same period. In addition, only 15 to 25% of wards (a subset of an LGA) in each state have a facility with functioning cold chain equipment.

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In a bid to address systemic underperformance, the leadership of Nigeria's National Primary Health Care Development Agency (NPHCDA) decided to tackle the supply and demand side factors contributing to the low immunization coverage rates. This paper focuses on the supply side interventions designed to increase in fridge availability at cold chain equipped health centers. NPHCDA has the overarching mandate of providing policy direction and guidance for the effective implementation of primary health care services in Nigeria. However, in a Federal system with decentralized management of primary health care the responsibility of States and LGAs, this is a complicated task. Nigeria's historic cold chain system consisted of five levels reflecting this administrative structure as follows:

1. A National Strategic Cold Store is the first storage location for all vaccines in country.
2. This in turn supplies six zonal stores, located in one of Nigeria's six geopolitical zones.
3. Each Zonal store then supplies six states within its zones
4. Historically, LGA stores collect their vaccines from their state store.
5. While primary health care centers collect their vaccines from their respective LGA store

The ultimate measure of success for any supply chain transformation is the increased visibility and availability of vaccines at the last mile. For a country of Nigeria's size, this requires equipping over 9565 primary health care centers with working cold chain equipment to ensure one equipped facility in every ward.[1] The operational cost and complexity of doing so is compounded by the decentralized nature of primary health care management with 36 States plus the Federal Capital Territory and 774 LGAs all having management responsibility for part of last mile handling and management. So even if the vaccines are available for resupply, operational funds or information flows are not necessarily always available to ensure the right vaccines are made available at the right time in the right quantity, right place and quality. While progress has been made, there is still a CCE gap of 3225 CCE and direct deliveries are only happening in 5 out of 36 States plus the Federal Capital Territory thus far.

This paper focuses on efforts targeted at strengthening the supply chain. As a first priority, a Department of Logistics and Health Commodities (DLHC) was set up in September 2015 charged with the mandate "to ensure that vaccines and other health commodities are supplied to the point of delivery on time, in full and in optimum condition". The logistics department was thus set up as the main driver of supply chain transformation initiatives at national and sub-national levels. Previously, a complicated organizational structure meant that lines of responsibility for different federal supply chain functions were blurred with a consequent lack of accountability and performance.

Commercial best practice has identified the importance of properly aligning and staffing the organization of the supply chain. It is important to make processes right first before adopting technology, optimizing inventory and distribution and improving end to end visibility [2,3]. Fig. 1. Developed by Gartner illustrates this approach.

This approach was echoed by Zaffran et al. in identifying opportunities to improve the visibility and efficiency of supply chains and potency of vaccines by adopting commercial best practice [4].

## 2. Leadership and culture crucial for strategy evolution

These approaches have been reflected in Nigeria's Vaccine Transformation Strategy developed by the DLHC in conjunction with in-country technical and development partners, constituted in the National Logistics Working Group (NLWG). The NLWG meets at least bi-weekly and serves as a strategy and implementation support group for the government.

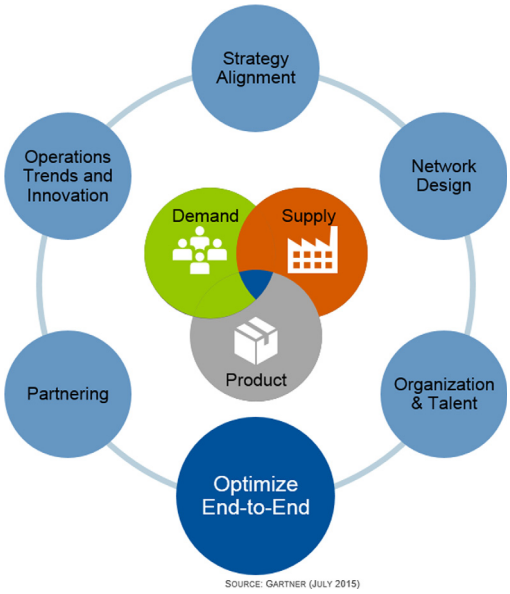


**Fig. 1.** Optimize end-to-end supply chain performance.

The thrust of the strategy was captioned, the "End to end transformation of Nigeria's immunization supply chain program" [5]. The strategy was articulated under 4 broad themes:

1. Stock visibility and management
2. Cold chain equipment support
3. Vaccines direct deliveries (PUSH Plus) at the state level and redesign at the federal level
4. Organizational leadership and culture strengthening

The approach adopted mirrored the transformation approach taken by the U.S. Centers for Disease Control (CDC) Vaccines for Children (VFC) program. CDC transformed the VFC program through the Vaccine Management Business Improvement Project (VMBIP), an ongoing, 12+ year engagement that including creating an end to end visibility platform and outsourced central warehousing and overnight distribution of vaccines to 44,000 primary health providers [6]. Fig. 2 summarizes key focus areas of the CDC approach. The approach also reflects elements of the work pioneered by VillageReach in Mozambique [7] including the focus on last mile delivery, improved information capture, financial flows management and taking innovation to scale.

### 2.1. Stock visibility and management

Through support from donors, the DLHC rolled out a vaccine dashboard, which collects stock data from 774 LGAs, 36 states + FCT and 6 zonal stores. The weekly review sessions of the dashboard created visibility for the first time across the system, ensuring that NPHCDA and other stakeholders can respond to the stock situation. As a result, there has been a marked improvement from a total of 263 (34%) of the 774 LGA cold stores having adequacy of all antigens at baseline in March 2013 to over 688 (89%) in April 2016. Standard operating procedures were defined and a process for reviewing data to identify LGAs and States risking stock outs established. As data visibility has improved, it became possible to identify and react to problems more quickly. For example, LGA availability for

[1] A ward is a sub unit of an LGA, with several wards typically in each LGA.