Nigeria Cold Chain Capacity Mapping
Postharvest Loss Alliance for Nutrition (PLAN)
Research Brief | March 2018

BACKGROUND

Each year, approximately 1.3 billion tonnes of the world's food gets lost or wasted, a loss that is especially devastating in Sub-Saharan Africa where an estimated 220 million people are undernourished[1]. In Nigeria, 40-50% of fresh fruits and vegetables (FFVs) are lost during postharvest periods, between the farm gate and market, causing these nutritious foods to be less available and affordable for consumers[2]. A significant portion of postharvest loss of FFVs is caused by inefficient and inadequate cold chain systems of storage and transport in addition to improper crating methods, poor infrastructure, lack of cool/cold storage technologies, poor education of handling at the farm, low access to funds, and food safety issues etc. These losses represent a waste of food and valuable nutrients, as well as economic, human and environmental resources such as farm inputs, financial investments, water and land[2].

As a leader in identifying and delivering solutions to address malnutrition, the **Global Alliance for Improved Nutrition (GAIN)** created the **Postharvest Loss Alliance for Nutrition (PLAN)** to bring together the multitude of public and private actors addressing this issue to collectively reduce loss and waste of nutritious food. PLAN supports GAIN Nigeria's mission to tackle malnutrition by increasing the affordability and availability of nutritious foods while utilizing a financially and operationally sustainable model. **PLAN Nigeria** is a national alliance, led by GAIN and made up of Nigerian stakeholders and actors that seek to decrease postharvest loss and waste (PHL/W) of nutritious foods.

Nigeria is one of 10 countries with the highest burden of malnutrition in the world: 37% stunting, 29% underweight and 18% wasting. With the largest economy in Africa, Nigeria has a robust and growing agro-industrial private sector that includes agro supply services and technologies, processors,

distributors and grocery chains; but has limited availability of quality private sector postharvest loss solutions. These qualities align with PLAN's national alliance criteria for high potential for impact and high feasibility of successful implementation.

In the last year, PLAN Nigeria contributed to building capabilities and leadership in Nigeria's agribusiness and food system by developing and sponsoring the integration of cold chain system technologies into the operations of selected businesses within the PLAN network. At the same time, PLAN organized a National Cold Chain summit to bring together all actors and stakeholders in the value chain to discuss and deliberate on the development of the cold chain sector in Nigeria. This summit culminated in the formation of a Cold Chain Association, **The Organisation for Technology Advancement of Cold Chain in West Africa (OTACCWA),** which will act as an umbrella body to mainstream cold chain technology integration for agricultural and economic development with the associated growth activities in Nigeria and rest of West Africa.

The Need for Cold Chain: A cold chain or cool chain is a temperature-controlled supply chain. In Sub-Saharan Africa,
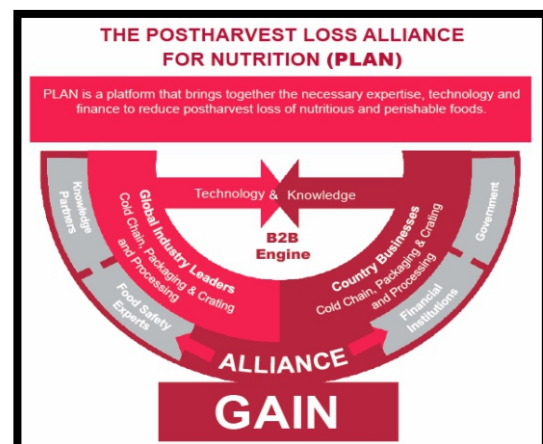
nearly 94 percent of all wasted food is a direct result of insufficient supply chains[3]. An unbroken cold chain is an uninterrupted series of refrigerated production, storage and distribution activities, along with associated equipment and logistics, which maintain a desired low-temperature range. Efficient cold chains preserve and extend the shelf life of products, such as fresh agricultural produce, seafood, poultry, meat, ice cream, frozen food, vaccines, etc. An estimated 55% of fruits and vegetables, 22% of meat, 35% of fish and seafood, and 20% of dairy is lost or wasted due to lacking cold chain infrastructure[1]. These postharvest losses exacerbate the food and nutrition insecurity in countries like Nigeria and force a reliance on imports.

A reliable and efficient cold chain system will contribute significantly to reducing food losses and waste in quality and quantity, improve efficiency of the supply chains and help deliver safer and more nutritious foods to the consumer. Reducing food losses will also reduce food shortages, lower price volatility in off seasons and contribute significantly to the national economy by reducing dependence on imports. Thus, Cold Chain development is paramount to improving food and nutrition security in Nigeria. However, the extent of the cold chain (storage, transport and logistics) capacity and utilization is presently undefined in Nigeria. Consequently, a functional cold chain system needs to be established from farm to table and this will require an extensive development of a business case for investors who wish to venture into this sector. It is imperative to capture the present cold chain capacities and capabilities as a nation for informed national policy and strategy development.

OBJECTIVES

The PLAN project, supported by the **Rockefeller Foundation,** recognized the need to conduct a national Cold Chain Capacity Mapping of Nigeria and contracted a study starting with a major commercial hub of the nation, Lagos State. **BASF West Africa Limited** also provided funding support of $5,000 to support the research assessment. GAIN initiated the Cold Chain Capacity Mapping activity to obtain reliable information on Cold Chain Capacity in Nigeria which can be used for effective policy decision support and to drive private sector business engagement opportunities. These opportunities can potentially address and resolve the shortage of cold chain facilities and mechanisms that are largely responsible for the extreme postharvest losses of nutritious foods in Nigeria.

The study identified the existing cold storage capacity in Nigeria for both freezing and ambient temperatures. The mapping outcomes provides information that can be utilized to stimulate private sector investments for infrastructure and much needed financial services, as well as education, and public awareness of the status of the sector.

The report provides needed information for cold chain stakeholders dialogue coordination necessary for effective cold chain development; Quality and Food Safety regulatory bodies can deduce ways of establishing up to date standards and regulations for this sector. The findings highlight the need for investment in innovation, both for small-scale affordable solutions particularly, as well as further research into alternative energy cold chain solutions for sustainability.


Fig. 1: Assessment Coverage Area in Lagos State

MAPPING COVERAGE

Ashley Baker Nigeria Limited was contracted by GAIN to carry out the cold chain capacity mapping exercise between December 20, 2017 and February 20, 2018. The mapping project covered thirteen (13) out of the twenty (20) Local Government Areas (LGAs) (Fig. 1) of Lagos State, Nigeria. Information and communications technology (ICT) tools, including Global Positioning System (GPS) and Cloud-infrastructure were used for efficient data collection, processing and management process.

FINDINGS

This report brief presents data captured in 13 LGAs in Lagos State on the distribution of cold chain facilities (i.e. cold rooms and cooling/chilling Rooms – frozen and ambient temperature storage), cold chain logistics service providers. Others are cold chain equipment manufacturers, professional & technical expertise for managing cold chain facilities, businesses selling cold chain equipment as well as cold chain skills development and empowerment centres (Fig.2).
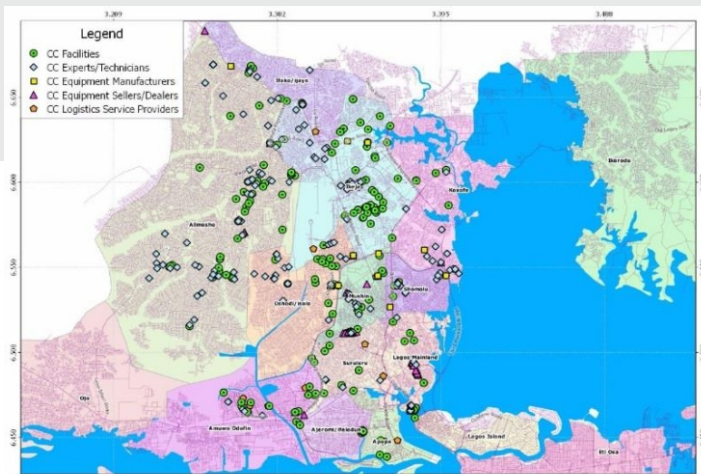
Figure 2: Distribution of the captured dataset across the Assessment Coverage Area (cc=Cold Chain)

facilities captured were locally built and maintained by Nigerian cold chain experts and technicians, which highlights the availability of skilled local expertise.

Table 1: Combined Cold Storage Capacity (Stationary Cold Storage & Refrigerated Logistics Vehicles) in the 13 LGAs

	Storage Capacity (cubic metres)		
LGA	Cold Rooms	Logistics Vehicles	Total
Agege	293	221	**514**
Ajeromi/Ifelodun	267	-	**267**
Alimosho	6,329	161	**6,490**
Amuwo-Odofin	30,144	2893	**33,037**
Apapa	7,579	1004	**8,583**
Ifako-Ijaye	337	-	**337**
Ikeja	573	41	**614**
Kosofe	1,647	25	**1,672**
Lagos Mainland	66	-	**66**
Mushin	228	-	**228**
Oshodi/Isolo	3338	428	**3,766**
Shomolu	46	-	**46**
Surulere	7731	34	**7,765**

The estimated total Cold Chain Storage Capacity of **63,385 Cubic Metres (**m^3) was captured in the 13 LGAs from a total of 244 cold chain facilities, comprising of 58,578 Cubic Metres from 217 stationary cold rooms/warehouses and 4,807 cubic Metres from 27 refrigerated logistics vehicles. Stationary Cold Chain Storage comprised 88.9% with Refrigerated Logistics Vehicles making 11.1%. The number of Cold Chain Experts/Technicians captured were 191, Cold Chain Equipment Manufacturers (10), and 110 cold chain equipment sellers/dealers. Analysis of the data from each LGA **(Table 1)** showed that **Amuwo-Odofin** had the highest storage capacity of 33,037 m^3 followed distantly in second place by Apapa (8,583 m^3) and third highest, Surulere (7,765 m^3) while the least storage capacity (46 m^3) was recorded in Shomolu. Interestingly, a sizeable number of the cold chain

The **63,385** cubic Metres of cold chain storage capacity is exclusive of the values not captured for about 30 businesses within the 13 LGAs that did not disclose their information.

We can also assume that if data was captured from the minimum of 30 businesses referenced above, which include two big time players (Shoprite and SPAR), there is a possibility that the total cold chain storage capacity will be at least about 100,000 m^3 within the 13 LGAs. From available data, we can assume that the **244** facilities visited plus the minimum of 30 businesses with undisclosed information represent about 70% of the total Cold Chain Facilities within the **13 LGAs**. Consequently, if we consider Lagos State (20 LGAs), we can estimate that the remaining 7 LGAs will contribute about 30% of the entire estimated capacity

(142,857 m^3), which gives an estimated 42,857 m^3. Therefore, considering the whole of Lagos State, we can estimate the total cold chain storage capacity to be around **200,000** m^3 which is twenty times higher than the **10,000** m^3 reported for Nigeria as a Country in the 2014 Global Cold Storage Capacity Report by the Global Cold Chain Alliance[4]

The cold storage space reported is mainly used for storing frozen foods such as chicken, turkey and fish. Many of these facilities still rely heavily on diesel generators for their operations as alternative power due to the epileptic power supply from Eko and Ikeja Electricity Distribution Companies (Eko DISCO and Ikeja DISCO). The reliance on diesel generators significantly increases the operational costs of cold chain facilities. Although limited in scope, we believe the data captured will provide baseline reference information on the storage capacities of cold chain facilities, logistical services and local expertise within Lagos State.

The data reported could also be very useful in designing intervention programmes for the development of a Cold Chain System in Lagos by the State Government, private sector investors, development partners, donor agencies and international non-governmental organizations. By extension, this system could stimulate the interest of the Federal Government of Nigeria at the national level to consider the cold chain as an integral part of strategic initiatives to achieve food and nutrition security in Nigeria.

The 2014 Global Cold Storage Capacity Report[4] that included several African countries showed Nigeria had 10,000 m^3 which was one of the lowest cold storage capacity on the continent. The recorded data indicated Namibia had 150,000 m^3**,** South Africa 323,000 m^3, Morocco 1,700,000 m^3 and Egypt 3,250,000 m^3. The findings of this study in Lagos State indicate that Nigeria's cold storage capacity has grown significantly and has great potential to develop and lead the cold chain industry sector in Africa. However, Nigeria's

capacity is yet to be fully harnessed. This report on Lagos State clearly indicates the need to conduct a more robust national capacity mapping of the cold chain sector and it is hoped that more data will be collected for Nigeria in the next iteration of the Global Cold Storage Capacity Report.

CONCLUSION

The data presented showed great potential to develop and harness the enormous benefits of a functional cold chain system in Nigeria. Strengthening the country's cold chain infrastructure can help reduce postharvest loss of nutritious foods as well as preserve health and pharmaceutical products such as vaccines. A more robust landscape mapping study is necessary to obtain data and fully inform all stakeholders, Government and private sector alike, on the strategies, policies and investments required to fully advance this latent but potent industry for overall improved nutrition and food security in Nigeria.

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To continue the conversation, join the PLAN Facebook Group
https:/www.facebook.com/groups/PLANnetwork/
the dedicated forum for PLAN members to discuss topics relevant to reducing postharvest losses in their operations.

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