



BRIGHAM AND
WOMEN'S HOSPITAL

CASES IN GLOBAL HEALTH DELIVERY

GHD-046
OCTOBER 2021

Improving Maternal Health by Addressing Stockouts: Integrating the Private Sector into the Public Health Supply Chain in Senegal

In late 2020, Mareme dismounted the moped taxi she had spent 1 USD (500 FCFA) on to get to the health clinic in the small town near her home in rural Senegal. She had left her four children at home with her mother-in-law. She hoped to be able to secure a Depo-Provera shot to prevent another pregnancy, which her family could not afford on her husband's meager salary as a peanut farmer. Mareme had tried to get the shot the month before, when she was already overdue, but the clinic was out of stock. Now she was hoping for better luck and for a negative pregnancy test. She did not know what was behind the clinic stockouts in the recent years and why, after many years of being able to count on Depo-Provera, she had to return home without it.

In 2011, with funding from the Bill & Melinda Gates Foundation, IntraHealth, a global nonprofit organization committed to strengthening health systems, worked with McKinsey & Company, to look at the supply chain for family planning supplies. Dr. Annette Seck, a pharmacist by training and logistics and health products specialist at IntraHealth, worked with the team and was part of the group tasked with presenting a new last-mile delivery solution to the Senegalese Ministry of Health and Social Action. Drawing on other supply chain models and private-sector success stories, they proposed bringing in private operators—third-party logisticians (3PLs)—to transport health products to service delivery points, based on consumption data the 3PLs would collect. The model became known as the Informed Push Model with Third Party Logisticians (IPM-3PL). It proved affordable and effective and gained national and international recognition as it was scaled up and adapted over time with support from donors, including Merck for Mothers, which joined the Gates Foundation as a primary supporter.

By 2016, the donors were ready to see the government take charge of the program and made what they thought would be a final investment. They planned to hand over full operational and financial responsibility for the supply chain starting October 1, 2017, with support ending June 2018. Two years later, however, Mareme and others were still feeling the effects of the rocky transition, including on their mental health. Seck had become the director of Senegal's National Supply Pharmacy (Pharmacie Nationale d'Approvisionnement;

Julie Rosenberg, Iman Ahmad, Nour Sharara, and Rebecca Weintraub prepared this teaching case with assistance from Souleymane Konate, Olumurejiwa Fatunde, and Eliel Ig-Izevbehai for the purpose of classroom discussion rather than to illustrate either effective or ineffective healthcare delivery practice.

Cases in Global Health Delivery are produced by the Global Health Delivery Project at Harvard. Case development support was provided in part by Merck for Mothers. © 2021 The President and Fellows of Harvard College. This case is licensed Creative Commons [Attribution-NonCommercial-NoDerivs 4.0 International](https://creativecommons.org/licenses/by-nc-nd/4.0/).

We invite you to learn more at www.globalhealthdelivery.org.

PNA) by this time and had to determine what was next for Senegal and what she could tell others who had been so closely watching the country as an example.

Overview of Senegal

Senegal was located in Western Africa and divided into 14 administrative regions (see **Exhibit 1** for administrative map of Senegal). In 2019, 48% of the population resided in urban areas, including the capital, Dakar. Population density was relatively low at 82 people per square kilometer.¹

Senegal's official language was French; however, 40% of the population spoke Wolof as their primary language.² Over 90% of the country's population practiced Islam.³ As of 2018, more than 60% of the population was under 25 years old.¹ The crude birth rate—35 per 1,000 people—ranked in the top 30 countries in the world.¹ The fertility rate in 2018, though down from over 7 births per woman in the mid-1980s, remained high at 4.6.¹

Senegal's unemployment fell from over 10.5% in 2011 to under 7.1% in 2020.¹ Unemployment was higher among those with intermediate education (11%) and advanced degrees (16%).¹

Data from 2009 showed road density, rural accessibility, and road network condition figures all below average for low-income countries.⁴ In 2019, Senegal had 110 mobile cellular subscriptions per 100 people, up from 2.5 in 2000.¹ Internet usage grew from less than 1% of the population in 2000 to approximately 30% in 2017.¹

Basic Socioeconomic and Demographic Indicatorsⁱ

| INDICATOR | YEAR | |
|--|----------------|------|
| UN Human Development Index ranking | 168 out of 189 | 2019 |
| Population (thousands) | 16,296,364 | 2019 |
| Urban population (%) | 48 | 2019 |
| Drinking water coverage (%) | 80.68 | 2017 |
| Poverty rate (headcount ratio at USD 1.90 per day, 2011 PPP) | 38.5 | 2011 |
| Gini index | 34.80 | 2018 |
| GDP per capita (constant 2010 USD) | 1,584 | 2019 |
| Literacy (%) (total/female/male) | 52/40/65 | 2017 |

ⁱ Compiled by case writers using data from the United Nations, UNICEF, World Bank, and UNESCO

History

In the 15th century, Portuguese fur traders made contact with the land now known as modern-day Senegambia. The French arrived in the early 17th century and created a maritime trading post for slaves and natural resources, which endured until the 19th century.

In the late 19th century, citizens in the cities of Dakar, Gorée, Saint-Louis, and Rufisque were granted French citizenship and the ability to vote. Out of these urban centers grew French West Africa, a federation of eight French-controlled African nations that included Senegal.² In 1958, members of the federation voted on their independence from French rule. Guinea was the only nation to vote for immediate independence. Various conflicts and configurations ensued, leading to the present-day nation of Senegal in 1960.⁵

Upon independence, the Socialist Party of Senegal's Léopold Sédar Senghor became the country's first president. Despite a coup attempt, a de facto one-party political system eventually emerged. Economic troubles plagued the country. Through state and para-state companies, the post-independence government took control of the agricultural market in hopes of eliminating the private sector. This initiative, which was originally meant to emancipate the peasant class, dismantle a system established by colonial rule, and stimulate the sector, ended up crippling industry and limiting peasant freedoms. Economic promises such as widespread industrialization and market growth, which presented Senegal as a beacon of opportunity, were never realized, despite large aid contributions from foreign governments. Senghor maintained power until he resigned in 1980 and picked Abdou Diouf as his successor.⁶

In the 1980s, an economic crisis heightened political tensions. Diouf's reelection in 1988 was protested heavily for alleged corruption.⁶ Divisions within the Socialist Party of Senegal ultimately toppled the party in 2000, leading to the election of President Abdoulaye Wade, who brought renewed hope for change.⁷

Macky Sall of the Alliance for the Republic was elected in 2012 and sought to uproot the legacy of the former president, including power shortages and a rising cost of living. Sall launched an ambitious plan to transform the country's economy and living conditions to put Senegal on the "road to development by 2035"⁸ and committed to achieve universal health coverage by 2022. With the country experiencing a GDP growth rate of 6%, he was reelected for a second term in 2019.

Health in Senegal

In 2000, the life expectancy at birth in Senegal was 57.7 years. The figure steadily increased since the turn of the century as HIV and malaria deaths decreased, but it remained lower than the average of other low- and middle-income countries, at 67.9 years, in 2019.¹ Respiratory infections, heart disease, and diarrheal diseases were the leading causes of death. The country historically faced high infant and maternal mortality rates.

Health System and Epidemiologic Indicatorsⁱⁱ

| INDICATOR | YEAR | |
|--|----------------|------|
| Average life expectancy at birth (total/female/male) | 67.7/69.6/65.5 | 2018 |
| Maternal mortality ratio (modeled estimate, per 100,000 live births) | 440 | 2018 |
| Under-five mortality rate (per 1,000 live births) | 45.3 | 2019 |
| Infant mortality rate (per 1,000 live births) | 32.7 | 2019 |

ⁱⁱ Compiled by case writers using data from the United Nations, UNICEF, and World Health Organization

| | | |
|--|------------|---------------------|
| Vaccination rates (% of DTP3 coverage) | 81 | 2018 |
| Undernourished (%) | 9.4 | 2018 |
| Adult (15–49 years) HIV prevalence (%) | 0.4 | 2019 |
| HIV antiretroviral therapy coverage (%) | 70 | 2019 |
| Tuberculosis incidence (per 100,000) | 117 | 2019 |
| Tuberculosis treatment coverage (%) | 70 | 2019 |
| Malaria incidence (per 1,000 at risk) | 55.75 | 2018 |
| Government expenditure on health as % of total government expenditure | 4.3 | 2018 |
| Government expenditure on health per capita (PPP international dollars/USD) | 34.8/14 | 2018 |
| Total health expenditure per capita (international dollars/USD) | 146.4/58.9 | 2018 |
| Physician density (per 10,000) | 0.692 | 2016 |
| Nursing and midwifery density (per 10,000) | 3.129 | 2016 |
| Number of hospital beds (per 10,000) | 3 | 2008 ⁱⁱⁱ |

Health System

The Ministry of Health and Social Action (MoHSA), led by the Cabinet of the Minister of Health and the Secretary General, managed the Senegalese health system, which was composed of three levels: district, regional, and central. There were 77 health districts covering over 1,000 healthcare service delivery points (SDPs), including at least one health center per district and a number of community health posts per district. A chief medical officer managed each district. Each of the 14 regions was led by a public health physician and an administrative team that oversaw the regional hospitals and implementation of health activities under the MoHSA.⁹

A 2017 census identified more than 2,753 private clinical facilities, pharmacies, and other private providers nationwide, 87% of which were concentrated in urban areas. Close to half of the facilities were pharmacies, almost a third of which were owned by women and more than half of which lacked financial resources to expand their business.¹⁰ A small number of private hospitals primarily served the wealthier population.¹¹

A study from 2007 to 2015 of 727 public and private health facilities showed that only 69% of hospitals and 60% of health centers demonstrated service readiness, a prerequisite to the delivery of quality healthcare.¹² Poor infrastructure, inadequate equipment, and, in many cases, stockouts of necessary drugs and devices rendered facilities, many of which were in rural areas, deficient. In 2014, MoHSA launched a national

ⁱⁱⁱ This number reflects the most recent data available.

initiative to help unify the community health workforce to improve healthcare coverage and quality in rural areas.¹³

Most Senegalese (93% in rural areas) went to the closest health facility for care, regardless of the quality.¹⁴ The average distance to the closest health facility was less than 4km and to a large health center or hospital, 20km.¹⁴ Many residents bypassed hospitals or health centers in favor of diagnosis at local pharmacies.¹⁵

Senegal has seen an expansion of pharmacies, especially in the private sector. In 2014, there were 1,013 pharmacies in Senegal, more than half of which were in Dakar.¹⁶ In 2013, nearly 40% of pharmacies had low inventory turnover and experienced difficulties given that the minimum setup cost for a pharmacy was approximately USD 5,400.¹⁷ Inventory turnover varied depending on location and proximity to the catchment area. In 2013, it ranged between USD 360 and USD 540 per day for the smaller pharmacies to between USD 1,800 and USD 3,600 per day for the larger ones.¹⁷ In 2012, the inventory turnover of the pharmaceutical market was estimated to be USD 147 million.¹⁷ This excluded the National Supply Pharmacy (Pharmacie Nationale d'Approvisionnement; PNA), which supplied public-sector medicines and commodities. In 2020, approximately 81% of household health commodity expenditure was made in private pharmacies, while 19% was made in the public-sector PNA. Each supplied about 50% of the market. The selling prices of commodities were higher in the private sector. In the public sector, all therapeutics to treat malaria, tuberculosis, and AIDS were free to patients due to donor support. For regulatory purposes, pharmacists were typically responsible for managing and overseeing drug distribution. About 90% of drugs were imported.¹⁷

Information Management and Data

Healthcare workers at all levels, including the PNA, lacked access to timely and relevant data and information.¹⁸ Government agencies such as the National Agency for Statistics and Demography managed information systems. Data reports, sent monthly from districts and quarterly from regions, contributed to central annual reports. Many hospitals and health centers lacked sufficient computer infrastructure and IT management and relied on written material.¹⁸ Paper-based systems impeded data aggregation and analysis and led to delayed and inaccurate reporting.

Health Financing System

Senegal's healthcare system was funded by a combination of sources. Foreign aid accounted for 12%–14% of healthcare spending from 2010 to 2018.¹⁹ In 2015, Senegal received over USD 147 million in official development assistance committed to specific healthcare initiatives.²⁰ The United States and the Global Fund were the two largest single contributors, specifically for malaria control.²⁰

Government budget allocations ranged from 24%–29% of total healthcare funding from 2010 to 2018.¹⁹ However, sources suggest the actual healthcare budget could be underfunded by up to 35% every year.¹ Public-sector healthcare workers' salaries required annual budget approval, which left them at risk for delayed payments.²¹ To combat this and incentivize quality care, Senegal implemented performance-based payment programs supplemented by foreign aid.

Out-of-pocket healthcare spending accounted for 52% to 61% of total healthcare funding from 2010 to 2018.¹⁹ As of 2016, almost 56% of out-of-pocket spending went to the private sector, including traditional healers and purchase of drugs.¹

Universal Health Coverage

In 2009, only 15% of people, primarily workers in the formal sector, had health insurance.¹⁴ In 2013, Senegal launched its Universal Health Coverage (UHC) program, which aimed to scale up community-based health insurance for informal and rural populations, reform the formal sector, strengthen existing free care

for pregnant women and the elderly, and provide free care for children under five, including medications. Government subsidies, household contributions, and development partners funded the UHC plan. The UHC plan reimbursed the SDPs for the qualified services and supplies they delivered. For example, as with all medications, the PNA would sell the qualified medications to SDPs, such as health posts. Instead of passing the cost for qualified medications to patients, the health posts would be reimbursed by UHC. However, there were often very long delays in reimbursement.²¹

The goal was to reach 75% of Senegal's population with UHC by 2017; but as of 2020, only 32% of the population was benefiting.^{22,23}

Public Health Supply Chain

Prior to 2013, the PNA was the sole distributor of public-sector medicines and commodities (not including vaccines or disease-specific medications)—over 350 products. The PNA was not allowed to sell to private pharmacies.¹⁷ Four private wholesalers were authorized by the PNA to supply private pharmacies with specialty drugs and a limited list of 67 generic products. Public health facilities could turn to the private sector only in the event of stockouts.

The PNA had a paper-based system to track SDP inventory and consumption data. However, the system was untimely and inefficient, so the PNA made purchasing decisions based on historical distribution data.

The PNA transported commodities from the national warehouse to the Regional Pharmacy Supply (Pharmacies Régionales d'Approvisionnement; PRA) using its own trucks. District staff transported health products from the PRA warehouses to the district warehouses. SDPs then purchased and retrieved the supplies using their personal motorcycles or other means of transport. Health facility staff were responsible for forecasting, managing, tracking, and ordering supplies (see **Exhibit 2** for PNA Supply Chain). Paper-based forms, difficulty in sharing data, and high human error rates complicated forecasting and restocking.

This system led to a myriad of challenges. The PNA often imported more products than were needed, leading to expiration and wastage. At the same time, there were often stockouts if demand increased. There were similar problems at the health facilities, and health workforce efforts were duplicated as disease programs executed overlapping processes. In addition, because health centers had limited cash and were also expected to pay in advance for all supplies purchased as well as other operational expenses, health workers prioritized purchasing higher-revenue-generating products to help keep operations afloat. A Finance Ministry accounting officer was responsible for each health facility's fund.

In addition, vertical disease programs funded by donors such as programs for malaria, tuberculosis, HIV/AIDS, vaccines, and reproductive health had parallel, separate systems for sourcing, storage, distribution, and logistics. For example, the National Tuberculosis Program distributed tuberculosis drugs and the Department of Reproductive Health and Child Survival distributed contraceptives.²⁴

Early Efforts to Streamline the Supply Chain

In 2009, WHO and an international nonprofit partnered to support MoHSA in optimizing its supply chains to address the increasingly costly portfolio of vaccines. While vaccines were normally handled by preventative medicine regional stores, the project—Project Optimize—aimed to launch a new vaccine supply chain model in the cities of Dakar and Saint-Louis in February 2010 that: integrated with other public-sector health products; streamlined the supply of vaccines at the local and regional levels, using a logistics management information system; and applied environmentally sound methods such as solar and other new technologies where possible.

In October 2010, the MoHSA and the PNA signed the Agreement for the Integration of Vaccines in the PNA Supply System: The MoHSA would pay the PNA to use its staff, warehouses, and transportation, and PNA would assume responsibility for receiving and storing vaccines.

In Saint-Louis, the PNA distributed vaccines alongside other products to the PRA, which had an upgraded cold store with new refrigerators and solar-powered freezers. IntraHealth International, a global health nonprofit working in more than 30 countries, supported the PNA. Its 2012 assessment of the public sector's capacity to manage last-mile distribution suggested that the supply chain integration led to significant improvements in stock management, from 56 stockouts to none. However, concerns surfaced about maintenance of equipment and the role of public health programs no longer overseeing their own supplies.²⁴ On top of this, the MoHSA did not pay the PNA its fees, and shortly afterward, the agreement was discontinued.

A deposit-sales system implemented to address SDP financial constraints aimed to increase access to all public health commodities. With this system, products would be supplied to health facilities before payments were collected, typically 30 days post-consumption.

Reproductive Health in Senegal

In 1991, Senegal launched its first national family planning program. In 2005, it passed a national reproductive health law outlining the rights of all citizens to access reproductive health and family planning services identified as important for reaching national health and development goals.²⁵ The Commodities Security Committee within the Reproductive Health and Child Survival Unit aimed to strengthen the distribution of contraceptive products.

In 2009, the Gates Foundation launched the Urban Reproductive Health Initiative with an investment of USD 156 million for family planning interventions and robust program evaluation in Nigeria, India, Kenya, and Senegal. At the time, the Gates Foundation had little presence in Francophone West Africa. The project officer made the case for Senegal to be included in the initiative:

Some of the greatest needs in the area of family planning exist in Francophone West Africa. We can do some deep learning and evidence generation in Senegal, a small but regionally influential country. In Senegal, there's strong leadership in place, and they're ready to try new things. And we believe that we can work with other countries, donors and partners to take the learning from Senegal and apply them, adapt them, for other parts of the region.

The Gates Foundation opened a request for proposals (RFP) for an implementation partner and chose IntraHealth. IntraHealth stood out because its leader, Pape Amadou Gaye, who was born and based in Senegal, had demonstrated an ability to engage regional leaders, including with Project Optimize.

In 2010, IntraHealth launched the Senegalese Urban Health Initiative in four cities: Dakar, Guédiawaye, Pikine, and Mbo. IntraHealth's country director, Babacar Gueye, explained, "Analyses in Senegal showed that most family planning efforts targeted rural areas while urban areas were not very well covered by programs and there was an urbanization trend. Against this backdrop, we thought a dynamic family planning program targeting major urban settlements was necessary."

The initiative aimed to improve quality and integration of family planning services, increase public-private partnerships around family planning, increase demand for family planning methods through conversations with local leaders and women, and advocate to the MoHSA for increased funding for family planning.²⁶ The aim was to increase contraceptive prevalence in urban areas by 20% over five years.

Senegal's modern contraceptive prevalence rate—the rate of women aged 15–49 using methods of contraception such as condoms, sterilization, and emergency contraception pills—was 12% among married women, one of the lowest in the world in 2011.¹

That year Senegal, with eight other Francophone West African countries, signed onto the Ouagadougou Partnership alongside donors. Together they acknowledged that the Francophone region had the highest rates of maternal and child mortality, highest fertility rates, lowest contraceptive prevalence rate, and least amount of assistance from donors for family planning compared with Anglophone and Lusophone countries. They agreed to reach at least 1 million additional women in the region with family planning services by 2015 and 2.2 million more by 2020 with better donor coordination and collaboration and cooperation at national and regional levels.²⁷

The country's Minister of Health launched Senegal's National Family Planning Action Plan to increase the national contraceptive prevalence rate for married women to 27% by 2015 and 45% by 2020. The plan addressed communication/demand creation, advocacy, contraceptive security, extending community-based services, strengthening private-sector services, and improving public-sector services.²⁸

Soon after launching, IntraHealth started hearing from women that there were limited family planning products at the SDPs. The MoHSA Director of the Department of Reproductive Health and Child Survival called the Gates Foundation program officer and relayed a concern he had received from one of Senegal's regions: "Look, this is unacceptable that women from my community are crossing this river, putting themselves and their babies in harm's way to go to a private clinic to access their contraceptive of choice."

The program officer reflected, "We made a false assumption that supply would not be a barrier in urban areas. We weren't implementing in rural parts of the country, and we just didn't understand the severity of stockouts and limited contraceptive availability throughout the country."

Finding a Solution

In 2011, the Gates Foundation funded the Maternal and Child Health Directorate and IntraHealth to partner with consultants from McKinsey & Company to conduct a diagnostic review of the public health supply chain. IntraHealth asked Dr. Annette Seck, a pharmacist by training and logistics and health products specialist at IntraHealth, to work with McKinsey.

A baseline survey in two semi-urban districts—14 facilities in Pikine and 25 facilities in Kaolack—using two tracer contraceptive products, injectable Depo-Provera and Jadelle, revealed stockouts at the healthcare facility level of over 80%. This was surprising to donors such as USAID and UNFPA, which were funding such products and knew they were available at the central level and at regional supply pharmacies.

The team identified three factors responsible for the health facility stockouts. First, staff placing orders at health facilities did not have logistics training and were expected to project needs without a logistics information system. Second, transportation problems often caused delays. And, third, family planning products generated the least amount of revenue for health facilities. Since SDPs were required to pay for all products up front, family planning products were deprioritized if there were any financial or budget constraints.

IPM-3PL Supply Chain Pilot Program

The McKinsey team proposed last-mile delivery recommendations to the MoHSA Director of Reproductive Health and Child Survival Unit, drawing on Project Optimize and other informed push supply chain models in Africa.

After a decade in the PNA, Dr. Oumy Kalsoum joined IntraHealth as a supply chain consultant and project director. She saw the private sector's fast last-mile delivery with companies such as Coca-Cola and suggested they "bring in a private operator" to transport health products from regional warehouses directly to SDPs, skipping the district. Information on consumption, gathered and generated by third-party logisticians (3PLs), would be used to calculate the stock needed. Payments were collected from facilities 30 days post-consumption as part of the deposit sales system. The model became known as the Informed Push Model with Third Party Logisticians (IPM-3PL).

After presentation of the model and expected outcomes, the MoHSA approved and endorsed it as a pilot. The Gates Foundation provided funding for the 3PLs. IntraHealth took the lead as the implementing agency, and various Senegalese non-governmental organizations and experts supported the effort. Long-term donors in Senegal's supply chain, such as USAID, UNICEF, WHO, The Global Fund, were informed of the initiative.

In 2011, IntraHealth, with support from the PNA, prepared to launch the IPM-3PL program in Pikine and Kaolack—the two districts that had many stockouts during the Senegalese Urban Health Initiative—to see whether it would improve stockout rates and how long it would take. The pilot began with nine contraceptive products over a period of six months.

IntraHealth entered a performance-based contract with a car rental company that would serve as the 3PL; every payment would be subject to deliverables being met. IntraHealth instructed the 3PL to retrieve products from the PRA, distribute them monthly to the 14 SDPs of Pikine and the 25 SDPs of Kaolack, make an inventory of the stock at these posts, determine recent consumption and replenish the stock to three-month levels. The 3PLs facilitated health facility payments to the PNA for products consumed. IntraHealth developed paper-based tools to collect information that would be entered into Excel and shared with MoHSA authorities to ensure visibility.

The IPM-3PL program coordinator, Seck, met with district chief medical officers and SDP nurses, among others, to coordinate the effort. Seck described the difficult adjustment for her colleagues: "New [private-sector] actors were being introduced into the supply chain that never existed ... You know that the unknown is always a source of concern." Seck followed the 3PLs to storage facilities to evaluate their work and found commodities were being stored as specified. Seck's initial role as facilitator between facility staff and the 3PL staff helped build trust.

Outcomes

Over six months, the average stockout rate of the nine products fell from 50%–80% to less than 2% across all facilities. An evaluation of the model showed that "level-skipping"—moving commodities from regional facilities to health facilities, bypassing the district stores—reduced costs by approximately 36%, compared with a public model with no 3PL providers,²⁹ and the deposit-sales system facilitated broad product acquisition by the SDPs.

The results and recommendations were sent to Senegal's MoHSA, and the Commodities Security Committee unanimously recommended that the IPM-3PL project be extended. Gueye reflected, "The results of the pilot phase were so compelling that we had buy-in from almost all the regional and national leaders before scale-up."

The Gates Foundation continued funding the operations of the 3PLs. Other international donors funded the PNA's procurement of family planning products.

Scaling Up IPM-3PL

Merck for Mothers (known as MSD for Mothers outside the US and Canada) was a global initiative of the pharmaceutical company Merck & Co., Inc., established in 2011 to “help create a world where no woman dies while giving life.” It wanted to expand its portfolio to include improved access to family planning services (modern contraceptives), widely recognized as a key driver for helping to reduce preventable maternal deaths. It met with the Gates Foundation family planning division in July 2012. They partnered, each committing USD 25 million to expand access to family planning through a three-pronged approach: (1) increasing awareness of and education about family planning services, (2) improving the supply chain for family planning resources and services, and (3) working with governments, the private sector, civil society, and local health providers to increase support and access to family planning services. They would work together to determine where to implement the approach.

In 2013, Priya Agrawal, executive director of Merck for Mothers, learned about the last-mile delivery problem in Senegal and IPM-3PL. “This is aligned to what the Minister wants for her country and it’s bold because every other global health program has strengthened the public-sector supply chain without integrating the private sector. It had potential and ticked a lot of boxes from our agenda,” she said.

Jeffrey Jacobs, Director of Product Innovation and Market Access at Merck for Mothers, explained, “Merck for Mothers utilizes expertise from within Merck, and supply chain is a core competency of Merck. We immediately reached into the company and brought forward supply chain expertise to help support this initiative, the organization’s first commitment in Senegal, and part of its partnership with the Gates Foundation.”

In 2013, with financial support from Gates and Merck for Mothers, the MoHSA and IntraHealth agreed to expand IPM-3PL—focused on delivery of nine family planning products—to all public health facilities nationwide with the donors’ support. They created an organizational chart, objectives, an action and budget plan, and an inclusive participation framework within the Ministry. The PNA would continue as the procurement entity and the Maternal and Child Health Directorate as the implementing body for family planning, working alongside donors.

Human Resources

PNA hired a few new staff at PRAs, including “stock-takers” who physically recorded stocks daily, and logistics specialists, pharmacists familiar with medicine storage standards who monitored the quality of the 3PL’s work.

Seck described the tensions: “It was very difficult because the existing staff did not necessarily understand the benefits for them. I think they believed in the public health impact, but all of a sudden there was additional work required.” MoHSA members from the pharmacy sector were concerned about the management of certain drugs. It was unheard of that people with no formal training in the health system would touch and transport drugs.

Seck addressed and managed the communication issues. “We had to drive the change, and that required a lot of energy.” IntraHealth’s Kalsoum added, “Because this system and the integration of private-sector logisticians was new to many districts, we had to convince the PNA and the regional and district chief medical officers that this approach would help them to move forward—work more efficiently and lower stockouts.” IntraHealth conducted outreach to explain the role of 3PLs and involved the PNA in performance monitoring activities to address concerns.

IntraHealth established a project team of 20 people (see **Exhibit 3** for the organizational chart). It divided the country into five zones and hired 3PLs from travel, trade, or transport companies for each zone through a competitive bidding process. IntraHealth trained the 3PLs in the medication stock management system and issued performance-based contracts with measurable distribution and payment collection goals. (See **Exhibit 4** for key performance indicators.)

After six months, there was more trust. Gueye explained, "I think this 'stranger' [the 3PL operator] was accepted. I think people now understand that private operators can do the work in accordance with the standards."

Technology

IntraHealth hired Dimagi, a company it had worked with previously, to set up an electronic logistics information system. Over 2,000 projects across 80 countries used the same system, called CommCare. To develop the system, Dimagi spent time on the front line observing the workflows to detect bottlenecks and then engaged their product and engineering teams.

IntraHealth's CommCare system, operated by the 3PLs, collected and transmitted SDP-level commodity and financial flow data in real time using an internet-enabled computer tablet. (See **Exhibit 5** for screenshots of the dashboard.) The IPM-3PL Monitoring and Evaluation Unit (within IntraHealth), regional logisticians, and the MoHSA all had access to the data. Dimagi wanted the IntraHealth team to own the system, be able to do technical troubleshooting, monitor and interpret data reports, and train end users and used a "training of trainers" model. The goal was that Intrahealth would then upskill and transition the system to the appropriate government counterparts.

Mohini Bhavsar, Dimagi's senior regional manager in West Africa, explained, "This was probably one of the only projects where we [Dimagi] implemented CommCare for a supply project in a push-based model ... All the programmatic mechanics of the push-based model had to work in order for the technology to be effective and data used effectively."

Launch

In 2014, IntraHealth launched the nationwide scale-up phase with nine family planning products. Operators began serving three regions—Kaolack, Thiès, and Dakar—which had a total of 560 SDPs. After several months, six regions and two complementary products were added.

To incentivize SDPs, IntraHealth "accredited" SDPs that had less than a 2% stockout rate of contraceptives, a 90%–100% information availability rate, and a 90%–100% cost recovery rate. Surveyors from IntraHealth conducted evaluations and verified the SDPs' accreditation.

IntraHealth set additional goals once one SDP became accredited; a target of one-third of SDPs in the district, followed by one-third of districts, followed by an entire district being accredited. They set up competitions between the districts and regions to keep them engaged and improving. Kalsoum explained,

If we know that the medical region needs a printer, a video projector, a photocopier, we provide these as incentives. If we find that the health post's shelf space is small, we increase it. If we realize that the storekeeper doesn't have a telephone to communicate with the operator, we give them a telephone. If the storekeeper does not have motorcycles to travel and make certain adjustments, we give them a motorcycle. These may be gifts, but they were functional gifts used at the facility level.

IntraHealth's district teams collected the funds from SDPs for products consumed, but it took a while to get these procedures working smoothly. Kalsoum said, "Throughout the roll-out, there were a few misunderstandings with SDPs. The mechanism for taking money out of SDPs is very complex."

Progress

In 2014, Seck was appointed director of the PNA, and Modibo Dicko, a supply chain management specialist who had worked on Project Optimize, joined IntraHealth as director of the IPM-3PL. Dicko noticed the lack of communication with the MoHSA and quickly mobilized to engage Senegal's Minister of Health. The engagement paid off. Jacobs shared, "The Minister was a real champion ... When we came in-country, she would receive us and listen to the progress, but also the challenges, and help us try to resolve some of the challenges." Dicko also hired a communication officer to showcase the "success story" of IPM-3PL. Communications such as television broadcasts and newspaper articles targeted the general population in order to promote IPM-3PL.

By August 2015, the private operators covered the entire public health system, including 14 regions, 76 districts, and 1,375 SDPs. In addition, 24 private practices and 22 hospitals enrolled in the IPM-3PL program, distributing family planning products following the established procedures. Nationwide, stockout rates of the 11 identified products were below 2% and overstocks and risks of expiry eliminated. The consumption of contraceptives rose from 16% in 2013 to 20% in 2014 and continued to increase.

IntraHealth presented results to the Product Supply Committee at the MoHSA, and people were impressed. Senegal gained international recognition, including winning the Aspen Institute's 2015 Resolve Award for Service Delivery.

Jegesi Naa

In 2015, the PNA introduced its own supply chain improvement project, Jegesi Naa ("I get closer"). Under this approach, instead of the PNA supplying only the PRA, drug stores were created at the district level. The PNA wanted to ensure there was availability of medicines closer to SDPs without the district having to mobilize significant financial and logistical resources for acquisition, which was a key challenge to products' availability in the past. The PNA was equipped with cars and trucks to transport health products to the district-level stores.

Over three months, the PNA tested this approach in the Fatick region, which had seven health districts, supplying five priority programs with 33 products. Every month, the PNA staff would take stock and go to the collection points using a system similar to the IPM system, conduct an inventory, make the collection, and then return with the information collected. After two and a half months of implementation, this pilot was halted and evaluated.

Gueye explained, "The PNA's system ensured downstream distribution of the medicines. The PNA would recover the money it invested in the procurement of the medicines when the healthcare providers consumed them. With the deposit/sale system, the investment recovery time was longer."

Integrating IMP-3PL and Jegesi Naa: Yeksi Naa

While the Minister of Health was pleased with the project's performance and affordability, she saw the need to address the issue of efficiency—the multiple supply chains.

“The MoHSA wanted to know why we were only working on family planning products,” IntraHealth’s Kalsoum said. “It wanted an IPM-like program in its other programs, including malaria, tuberculosis, and AIDS.” The Minister asked the group to integrate more products and show both its ability to perform and to remain affordable. “You need to show us what you can do,” she said.

The MoHSA requested that PNA and IntraHealth evaluate the feasibility and effectiveness of distributing a wider number of products within a single model. Merck for Mothers and the Gates Foundation supported the work. With McKinsey, they compared three different scenarios over six months in 2015–2016 in a limited number of districts using the same IPM-3PL model, with (1) private operators transporting medicine from the PRA directly to the health facilities (“level skipping” the districts); (2) the PNA delivering medicines to the PRA and to the district warehouses and then private operators taking the commodities from the districts to service delivery outlets (a modified version of the IPM-3PL model), and (3) PNA/PRA delivering the medicines all the way to the health facilities. (See **Exhibit 6** for illustration of different models).

Findings showed that the costs of including additional essential medicines were comparable between models, while commodity availability performance favored the IPM-3PL model. Level-skipping raised a lot of concern. The government, one of the largest employers in the country, did not want to be perceived as removing jobs, and the districts were concerned with losing oversight responsibilities. Following what Gueye described as “lengthy and difficult [internal] discussions,” the Minister of Health approved option 2, which would maintain the district stores and jobs and rely on 3PLs for delivery to SDPs from the districts.

The combination of the PNA initiative (Jegsi Naa) and donor-funded IPM-3PL program became known as Yeksi Naa (“I have arrived”). Seck expressed, “Everybody was delighted. This was about the healthcare system. The big difficulty was that you had to put all the pieces together and discuss the model, and we wanted to make it a Senegalese model, starting from the IPM model. IPM was a project, while Yeksi Naa was a state program based on the IPM model. We figured that this was not just the PNA’s job.”

The Gates Foundation and Merck for Mothers extended coverage of the operational and logistics costs and re-contracted IntraHealth, with a view toward handing over full operational and financial responsibility for Yeksi Naa to the MoHSA/PNA starting October 1, 2017. The Gates Foundation and Merck for Mothers were prepared to support the transition with troubleshooting and monitoring until June 2018. Jacobs felt confident it would happen. “It was always expressed from the president down to the Minister down to the PNA that there is no going back: We are committed to integrating 3PLs, you’ve shown us that it can work, that it can be affordable, and performance can increase significantly. So, there is no going back.”

Governance

The Minister of Health chaired a National Technical Committee focused on the supply chain for public health commodities, which included all the donors and various branches of the MoHSA. The committee met twice a year to discuss supply chain performance, finances, enforcement of guidelines, partnerships, and other major decisions.

The MoHSA established a Regional Committee to meet the donors’ sustainability requirements, to deepen regional buy-in, and provide strategic support.

The PNA established a monthly Steering Committee including IntraHealth, the MoHSA, and a few partners to discuss planning, results, challenges and troubleshooting.

Jacobs brought in two Merck experts on financial and product flow management to support IntraHealth and the MoHSA, and he brought in fellows from the Gates-supported African Resource Center (ARC) to support broader supply chain issues in Senegal.

Rollout

The MoHSA established the list of products for Yeksi Naa—118 commodities—that included: high-, low-, and no-margin (free) products. Integration of new products was planned in “waves.” (See **Exhibit 7** on timeline.) The PNA committed almost USD 4 million for the initial stock, which would cover 6–9 months, depending on consumption. Many infectious disease products were provided for free by donors such as the Global Fund to Fight AIDS, Tuberculosis, and Malaria. Wave 1 products were selected based on their availability in the PNA’s stock and included about 50 products from the National List of Essential Medicines, including family planning, TB, HIV, and malaria products in October 2016.

On August 4th, 2016, the MoHSA, in partnership with IntraHealth, officially launched Yeksi Naa with a ribbon cutting ceremony attended by leaders from MoHSA, PNA, IntraHealth, Merck for Mothers, the Gates Foundation, and others.

IntraHealth managed most operations; PNA staff were supposed to shadow them to prepare for the transition. The 3PLs’ role remained the same. They carried out monthly deliveries to SDPs, which included physical count of existing stocks, stock replenishment, real-time data entry and transmission, collection of expired products, and issuing of commodity invoices.

Dimagi upgraded its system to integrate the 50 wave 1 products. It collected feedback from several 3PLs and traveled to rural areas to test the app on a 2G network. The 3PL providers used a logistics management and information system for inventory/stocking data entry and were responsible for invoicing on consumption.

About eight months after wave 1 began in three regions of the country (Dakar, Kaolack, and Thies), wave 2 products, primarily generic essential medicines, were gradually added. By September 2017, nearly 100 products were distributed by 3PL providers in nine regions of the country. Wave 2 products came from the PNA as well as UNICEF and World Bank and included larger items like solutions that required greater capacity to transport. Seck explained, “What was certain was that the wider the basket (of products), the more difficult the push distribution was. All of a sudden, supply increased threefold because, quite simply, bringing products to the SDPs expanded its product range and medicine quantities.”

Not all stakeholders took well to the launch. The National Program of Immunization was adamantly against non-medical staff—the 3PLs—handling vaccines. To ease concerns, IntraHealth organized a pilot project in which the Program would train the 3PLs. The project was not completed, however, and vaccines were never integrated into Yeksi Naa, except for in the Saint-Louis region.

Another tension arose with the regional and district medical officers. A supply chain specialist at the MoHSA explained, “They have authority over the healthcare system. But they were not involved in the day-to-day decisions about Yeksi Naa. They were frustrated.” Meetings with the regional chief medical officers and district chief medical officers were held to resolve the tensions; however, it was hard to do so once things were already in motion.

Transfer to the Government

The National Technical Committee and the Minister and her cabinet agreed the PNA would integrate all the selected commodities into Yeksi Naa for distribution to all 14 regions over a period of one year. At the same time, it was planned that the MoHSA/PNA would take over full operational and financial responsibility for Yeksi Naa as of October 1, 2017.

The MoHSA, with Gates Foundation funding, appointed a supply chain technical adviser, Dr. Abdoulhath Mangane, to the Ministry of Health Cabinet to assist with the transition for a period of time.

IntraHealth assisted the PNA with refining procedures, establishing monitoring criteria, creating contract models specific to hiring external vendors, and developing a playbook. The PNA stepped up its leadership. It issued an RFP (request for proposals) and worked on identifying and selecting 3PLs to issue new contracts.

When the PNA requested its IT team of 3–4 engineers to take over hosting the CommCare server and data, Dimagi suggested another experienced Senegalese IT organization to take over the server. The PNA, as owner of the data, felt it imperative to host the data and proceeded with the purchase of a server. Dimagi created a technology transfer plan and a timeline with suggested dates and capabilities to demonstrate.

This was Dimagi's first time training government officials on how to manage a local server in Senegal, in French. It observed that this would require additional technical skills and offered additional trainings to the PNA.

Bhavsar noted, "It was genuinely hard for IntraHealth, Dimagi, and the PNA to figure out how to manage the tripartite communication to achieve the results, especially as transition had begun." Initially, Dimagi primarily communicated directly with the PNA; however, IntraHealth wanted to be involved as the lead NGO supporting the program. Ultimately, it was decided that communications were to be made in sequence from Dimagi to IntraHealth and then from IntraHealth to PNA, even though for technical conversations, it may have been more effective to have the technology partner directly converse with the government technology teams. The donors reinforced IntraHealth's role of mentoring the PNA through the transitions in IT/CommCare, operations, finance, and procurement/3PL contracting.

Financing the System

Aware of increasing donor emphasis on transition to government and the need to create a financially sustainable model, Dicko recruited McKinsey to conduct a transition feasibility study. They extrapolated from the smaller portfolio of commodities to assess feasibility and affordability for the 100+ commodities in the Yeski Naa model. The study suggested two sources of financing: (1) increasing fees collected from the vertical disease-area programs and (2) collecting a fee from each facility as a percentage of its incremental margin ("margin redistribution"), suggested at 25% (see **Exhibit 8** for comparison of program contributions and estimated costs).

The PNA laid its proposal before the vertical funded programs: "We bring your commodities to the SDPs, and we bring back consumption data. Therefore, we think increasing your contribution to logistics from 5% to 10% would be fair." While the HIV and TB programs agreed, others did not.

The MoHSA Director of the Department of Mother and Child Health explained, "This arrangement would not work because they were instructions, and Senegalese people don't like instructions. Even though we are operating in a decentralized system, people don't like having things imposed on them. We have to involve them, discuss things with them, until a consensus is reached. There was no consensus on the funding model."

Redistributing 25% of service delivery incremental margins would represent 67% of the supply chain expenses and cover the PNA's distribution costs. This was calculated based on projected increased inventory turnover, or sales. The price of commodities would be the same throughout the country. The high-margin commodities would contribute the most toward a domestically resourced model, with additional funds coming from the state, vertical programs, and out-of-pocket expenses when the donors would pull out. The

margin redistribution model did not adequately consider the reimbursement dependency of universal health coverage (UHC) policies on facility-based free care provision, including commodities. The UHC monthly commodity consumption financial flow was distinct—payment went from UHC to reimburse the SDPs, which would ultimately pay the PNA.

IntraHealth and the PNA organized a campaign to explain the proposal to district and SDP committees. Mangane shared, “Management fees are normal. The PNA stores, transports, and distributes commodities.”

Of the 14 regions, 13 welcomed the proposal. Some SDPs, specifically those close to the national supply pharmacy, suggested paying the same 25% as facilities 100 km away was unfair. Dicko elaborated, “The notion of equalization for essential medicines was not well understood, and some people started getting restive, extensively delaying the activities we had planned.”

After a significant delay, IntraHealth prepared a bulletin signed by the Minister, requesting that the vertical programs increase their contribution and authorizing the PNA to collect 25% of the incremental margin from SDPs and districts.

The proposed cost recovery mechanism covered 75% of costs. Donors advocated for an additional 15% from vertical programs and 10% from the Ministry of Economy and Finance. The funding model required reconciliation of invoices with delivery information between districts, SDPs, and the PNA. In addition, the cost recovery model needed to aggregate and reconcile claims from the SDPs to claim payment from the UHC plan. The new billing system was based on the consumption that took place at the health facility. The model required collaboration between the MoHSA, UHC, Ministry of Economy and Finance, and PNA to supervise the flow of goods and funding from the national to the district to the SDP level. Timely payments between stakeholders was a fundamental assumption of the funding model.

Transfer

On September 7, 2017, Abdoulaye Diouf Sarr became the Minister of Health and Social Action of the Republic of Senegal. On October 1st, 2017, the PNA took official ownership of Yeksi Naa. At this time, nine of the 14 regions had been integrated and transferred to the PNA under IntraHealth’s mentorship. IntraHealth worried that the transition was occurring too fast. Jacobs explained, “Rather than the planned phased approach where the PNA could learn and understand where the challenges were and, with partner support, fix these before advancing, due to delays in integrating regions, on transition day, the PNA became fully responsible for all nine regions, practically, in one lump sum.”

Seck saw things differently: “Things were done gradually. I disagree when people say things were rushed. The IPM project truly made sure to coach the stakeholders/actors.”

Data Flow

Procedures for checking in and out inventory at district stores—tabulating inventory via paper forms then entering into CommCare—consumed up to 25% of each 3PL’s working day. Additionally, the 3PLs had to take products from each district warehouse early in the morning and return those not distributed during the day to the same district warehouse, which led to very late nights. The result: The differences between what 3PLs recorded manually on invoices and the consumption data recorded in CommCare was significant. Checking the in-out-in flow of the 50 or 100 products on the invoices required time at the SDP that many 3PL did not plan for and may have resulted in poor data quality.

Limited PNA experience in IT service contract management and lack of clarity in hosting, data management, and service level agreements exacerbated data issues. In addition, 3PL staff had only a limited number of tablets to collect data at facilities. This added additional complexities. Dimagi’s Bhavsar explained:

I keep advocating for bringing tech providers like Dimagi into the upstream conversations with stakeholders—for example, at round tables, workshops, etc.—when the requirements and needs are being discussed, including when requirements change, so that we have the big picture in mind. This is important so that the technology partner can be responsive. In addition, in a push-based supply program, there is great dependency on other non-technology processes working effectively ... success of the technology is incumbent and reliant on other processes succeeding. We only saw certain parts of puzzle ...

Human Resource Capacity

Logistics management staff at the PNA, charged with overseeing 3PL distribution, decreased significantly despite McKinsey and Company's recommendations. This slowed distribution and reduced monitoring capacity. Simultaneously, managing 3PL vendor contracts and overseeing their distribution performance, coupled with the increase to over 100 products distributed, increased complexity substantially; vertical programs had previously played a major role in procurement and distribution planning, and the PNA had not anticipated taking on this activity.

Further, while the PNA followed public procurement procedures of the Republic of Senegal, submitting the contracts of the selected 3PLs to the Directorate of Public Procurement Contracts, the cost of the contracts was greater than the working capital declared by the PNA, and the file was rejected for insufficient provisions. Gueye said, "We quickly realized there was a lot of red tape in the public sector."

Financial Flow

Despite the evidence showing an increase in the SDPs' margin due to higher consumption made possible by better availability of stocks and increased patient numbers, actual PNA revenues—from SDP reimbursement for consumed commodities—were low.

There were limited processes to collect SDP payments and insufficient staffing at all levels of the system to manage financial claims. Districts functioned as an intermediary for payments and disbursements, which led to an additional delay in the flow of funds in both directions of around two months (see **Exhibit 9** for cash cycle).

SDPs also faced 6–12 month delays in reimbursement for UHC claims. The SDPs were de-capitalizing as money was going out faster than reimbursements were coming in and were refusing to reimburse the PNA for consumed commodities until UHC reimbursements were accelerated. Mangane explained, "Unfortunately, this allows the SDPs to say, 'The UHC didn't reimburse us. We can't reimburse the drugs ourselves.'"

To avoid stockouts, the PNA defaulted to increasing inventory. As a result, many drugs expired, there was slow conversion of stocks to cash, and stockouts increased for high-demand products.

The issue of timely reimbursement from UHC to SDPs had surfaced only minimally during the earlier initiatives but became more acute as more free special program commodities were integrated into the model. In theory, SDPs had to pay the PNA for commodities 30 days post-consumption, and PNA used these funds to pay for 3PL contracts. Within months, the PNA receivables reached 30%–50% of sales, meaning the PNA was owed almost as much as it was paid. The actual costs of the distribution model on which Yeksi Naa was built were also 13% higher than expected. Kalsoum explained,

Implementation was based on forecasts, and there were risks identified with the forecasts. If payments are not made or are late, there is a problem ... At some point the PNA could no longer carry on because it had invested billions [in West African CFA francs] into the pipeline. There was no return on investment without the SDPs paying their part, and 3PLs were needed but quit without being paid.

Outreach to Donors

At the end of December 2017, the stockout rate of family planning products for the nine regions was at 15.68%, compared with 1.87% in September 2017. In early January 2018, the PNA approached the donors, expressing concerns about its ability to effectively manage Yeksi Naa despite its initial confidence: “We’re really having some struggles.” Jacobs reflected:

Because there were no voiced concerns over the initial three months post-transition, we were surprised by the depth of the accumulated issues. Communication from the PNA to us and to IntraHealth stopped, and we lacked visibility into what was happening. Our relationship with the new Minister of Health also wasn’t as strong because we didn’t have that long-term history.

Merck for Mothers and other donors were caught off guard by how dependent the financing model was on timely reimbursement from UHC to SDPs. Jacobs called the 3PLs to ask what was happening and learned they had not been paid since October 1. From January to March 2018, there was a 67% availability rate in health facilities.^{iv} Stockout rates increased for contraceptives and other tracer products such as oxytocin. Donors got the PNA to commit to paying the 3PLs part of what they were owed and got them restarted in April 2018.

IntraHealth fielded many questions from donors and held many discussions about the causes of these stockouts. Beyond financial issues, Gueye further elaborated on the technical challenges: “The PNA wanted all data to be transferred to its system, but there were technical glitches. I don’t know what happened, but everyone has their own version of the story. People wanted autonomy in data management. The technicians argued there were issues with the server. In short, there was a deadlock in the system.”

In 2018, there were approximately USD 2.6 million worth of drugs that expired on shelves unused—an increase of 79% on the previous year.

Developing a Roadmap

The National Technical Committee was called to review the issues and developed a roadmap with two objectives: to revive Yeksi Naa and to strengthen the PNA. The MoHSA asked donors for funding through the end of 2019. The Gates Foundation and Merck for Mothers agreed to support just a yearlong project from July 2018 to July 2019.

The Gates Foundation provided support specifically for capacity building of the PNA and the support staff on the ground. Merck for Mothers funded the contracting of 3PLs through IntraHealth “on the condition that the PNA issues an RFP for 3PLs quickly because it takes four, five months for it to go through the process.” The contract emphasized, according to Jacobs, that IntraHealth needed to focus its efforts on mentoring PNA staff to make sure that its capacity was built and IntraHealth’s knowledge transitioned.

In the meantime, Merck for Mothers advocated for the World Bank to provide additional, longer-term funding for the 3PLs. Following bureaucratic delays, the World Bank funding covered just one month for a limited number of regions. Nevertheless, with compensation secured until mid-2019, 3PLs went back to work, and stockouts began to drop.

In March 2019, Ann Allen joined the Gates Foundation as a Program Officer in Supply Chain Systems in Seattle, Washington, USA, with a “damage-control mindset.” She aimed to build relationships with other supply chain donors in Senegal, such as the World Bank, USAID, and the Global Fund, to align investments and move toward a shared vision.

^{iv} Availability rate = (Number of SDP without a rupture)/(Total number of SDP) * 100

Through conversations, Allen realized that a shared vision would be hard to achieve when the government did not have a “vision for how they would most effectively and efficiently deliver healthcare in their country that could guide them.” For example, during this time, USAID got government approval to build several new supply warehouses at the district level. Allen stated, “This is exactly what we wanted to move in the opposite direction from. Good governance, efficient processes, strong oversight, sustainable financing, and data visibility were of greatest need—not more state-maintained infrastructure.”

The MoHSA budgeted USD 368,000 in the 2019 finance law for 3PLs, which would cover 86% of total costs. In July 2019, the MoHSA and the PNA selected the 3PLs from RFP submissions. Unfortunately, with broad fiscal challenges disrupting many governmental initiatives, the Ministry of Finance did not fully understand the Yeksi Naa program—and its importance—and cut the budget line.

At the end of July 2019, donor funding ended. Allen and Jacobs held difficult discussions with MoHSA leaders. Allen elaborated, “Do we prop it up for another year, knowing that this is going to send the message to the government that *we will always come in and pay for it, and you don't need to actually take ownership of it?* Or do we let it fall, knowing that women and mothers and children ... will immediately suffer because of it?”

PNA debts continued to increase by 4% monthly, predominantly due to the lagging reimbursements between UHC-SDPs and SDPs-PNA. The 3PLs stopped working again due to lack of payments. Data collection in CommCare halted. Yeksi Naa was suspended. The MoHSA, despite its commitment to the outsourcing of last-mile health commodity distribution, reverted to the prior supply chain model while it sought ways to restart Yeksi Naa.

Evaluations and Reflections

Despite the setbacks, in May 2019, the MoHSA, in collaboration with the Gates Foundation, Merck for Mothers, and the World Bank, requested an independent assessment of the operational model to provide recommendations to make it financially sustainable. ARC consultants were appointed to lead the evaluation under the supervision of the Directorate of Planning, Research and Statistics in close collaboration with the MoHSA and donors.

The data collection process was tedious. Data sources were diverse, and some stakeholders were reluctant to share information despite a letter of introduction from the Minister of Health. The PNA claims records were not clear or consistent and the PNA denied access to consumption data from CommCare. Additional limitations included lack of visibility on the debt structure of SDPs and on procurement procedures and inventories of district and regional supply pharmacies. Despite these challenges, many stakeholders agreed that re-achieving consistent commodity supply was a desired goal.

In March 2020, after working with donors to frame the findings, ARC presented the preliminary results to stakeholders. The MoHSA and PNA added “their recommendations” to the final evaluation, presented in June 2020. The evaluation outlined five key components for an efficient supply chain: (1) consolidating governance, (2) creating centralized financing for distribution, (3) developing an end-to-end visibility strategy, (4) establishing a planning center of excellence, and (5) network optimization (see **Exhibit 10** for overview of recommendations).

Allen further elaborated, “What we learned through the assessment was that all of the systemic issues were yet to be addressed. We were cautious not to say it failed. The Yeksi Naa program is kind of a jewel. It had the president's eye at some point.” Jacobs was worried that discrediting Yeksi Naa would throw out the idea of outsourcing altogether. He explained, “There are a lot of ideological differences about integrating the private sector into the public supply chain. A number of stakeholders across the system still had reticence

about integrating the private sector and were against taking a percentage from the facilities to fund the model. While these perspectives are important to acknowledge, the facts speak for themselves: Using 3PLs to distribute health commodities was shown to be reliable and affordable for three years plus. And, ultimately, supply chain needs to be about reliable, affordable access for patients and the healthcare system as a whole.”

Seck added, “A national program is not just about resources—it is about human resources, culture, ownership, sociology, management, political will, and government commitment. There are some parameters that are not project parameters. It was not always easy to persuade all the stakeholders that this was the best solution.”

Kalsoum reflected, “Perhaps what didn’t work was that there was no real collaboration between the PNA, the SDPs, and the MoHSA. I think the PNA was trying to solve the problems on its own. The PNA thought that Yeksi Naa was its property. The whole system had to be involved in the management process.” Seck added,

I said, “Be careful. The supply chain is a whole; it can’t be the PNA’s business only, and we’re going to have bottlenecks if we continue in that mindset.” For example, to convene a meeting of the steering committee of Yeksi Naa, the PNA can be in charge but cannot convene the regional chief medical officers. The Minister has to be the one convening the players. Therefore, I think it was necessary to clearly differentiate between the management of the program at the national level and the management of the distribution model.

Looking Ahead

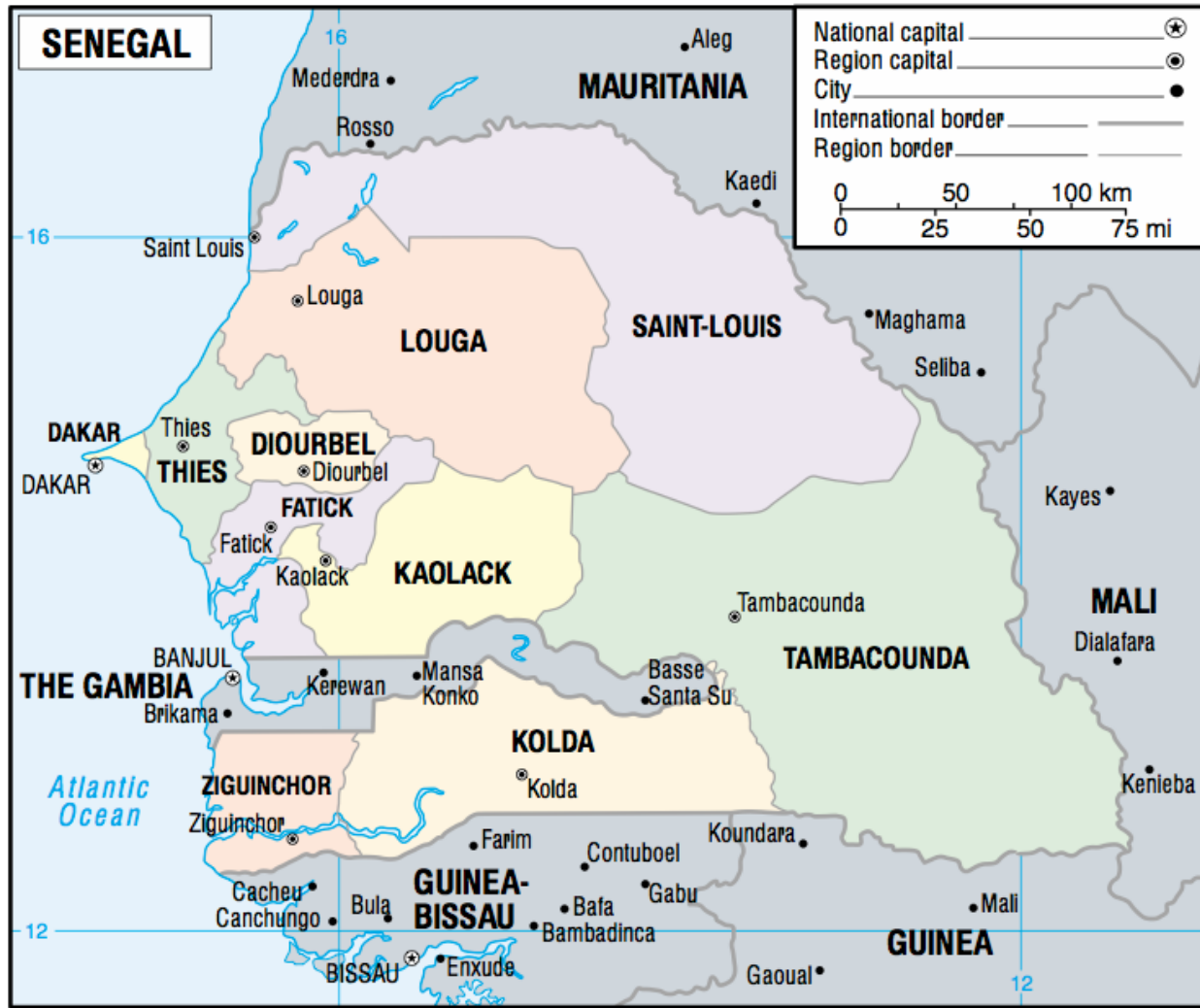
In late 2020, the MoHSA conducted a workshop discussing the evaluation and the next steps. What emerged was the recommendation to do several more evaluations to understand how to fix the current system. The World Bank planned to launch a comprehensive study on the public finance management of Yeksi Naa.

To Jacobs, the big question was whether there was political will. From the president, to the Minister of Health, to the director of the PNA, it was stated that Yeksi Naa was the chosen model, based on the success of initial pilots that transitioned to durable performance at a national scale (of, granted, a limited number of products and affordability metrics); that there was no turning back. The goal and timing of government ownership was mutually decided. That there were teething issues upon transition were to be expected. But at the first sign of trouble, that there was backtracking by key stakeholders on Yeksi Naa the model—and its critical role in helping the country achieve its health objectives—was concerning. To Seck, the questions were different:

First of all, we need to know: What is the technical capacity of this model? Should this model be restricted to priority products? It is important to know that. How many products can it take? A maximum of 30 products? Forty products? What are the products that the country needs to choose based on its programmatic objectives?

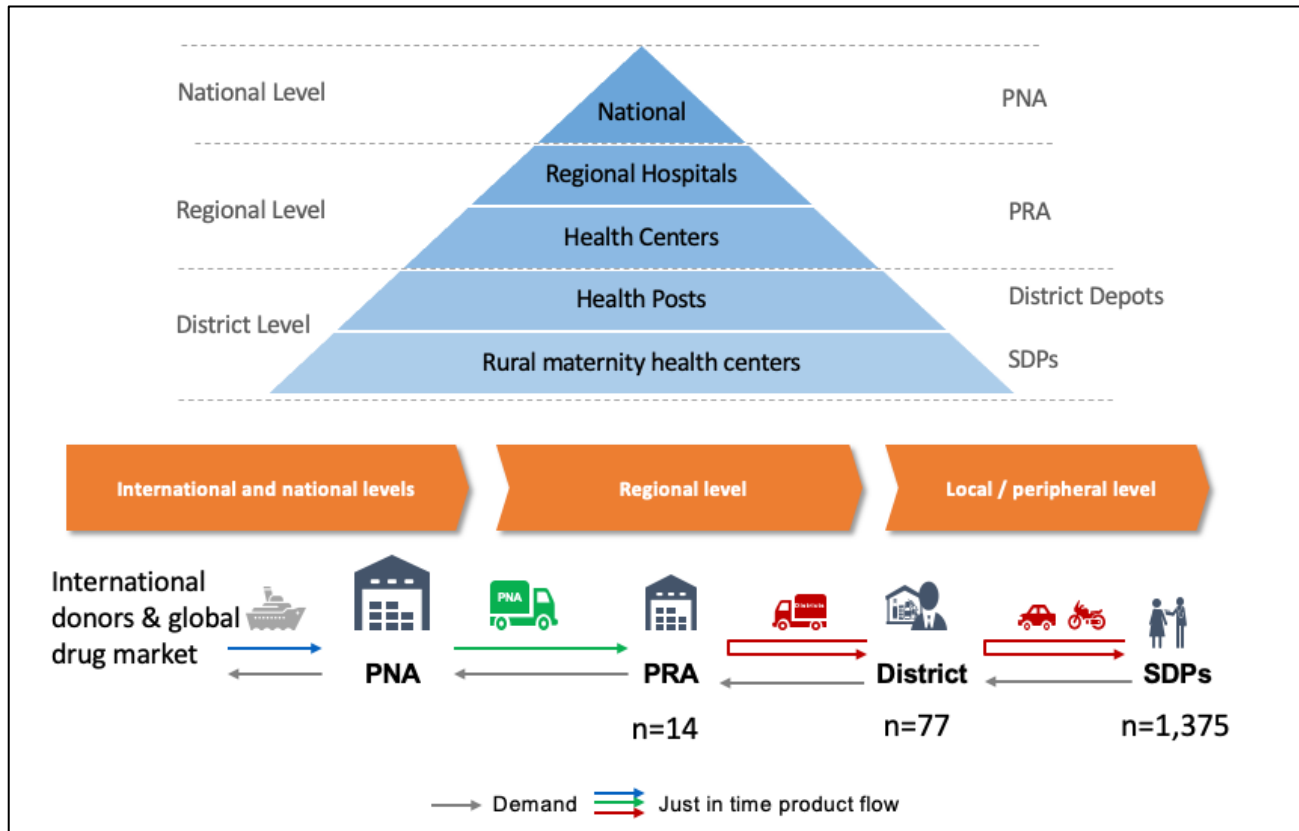
Seck was hopeful that Yeksi Naa would get “a new lease on life.” She reflected, “All those who worked on it should sit together again and give consideration to the lessons learned. Despite some reservations, I am confident that this is an excellent model that has been adapted,” she said. As other countries looked in on Senegal as a model to their own supply chains, Seck had to ask herself, what were the lessons learned and how would she rebuild differently, if given the chance? What did Senegal’s effort mean for others who had been using it as a model?

Exhibit 1 Administrative Map of Senegal



Source: Perry-Castañeda Library Map Collection, University of Texas at Austin.
<https://legacy.lib.utexas.edu/maps/senegal.html>

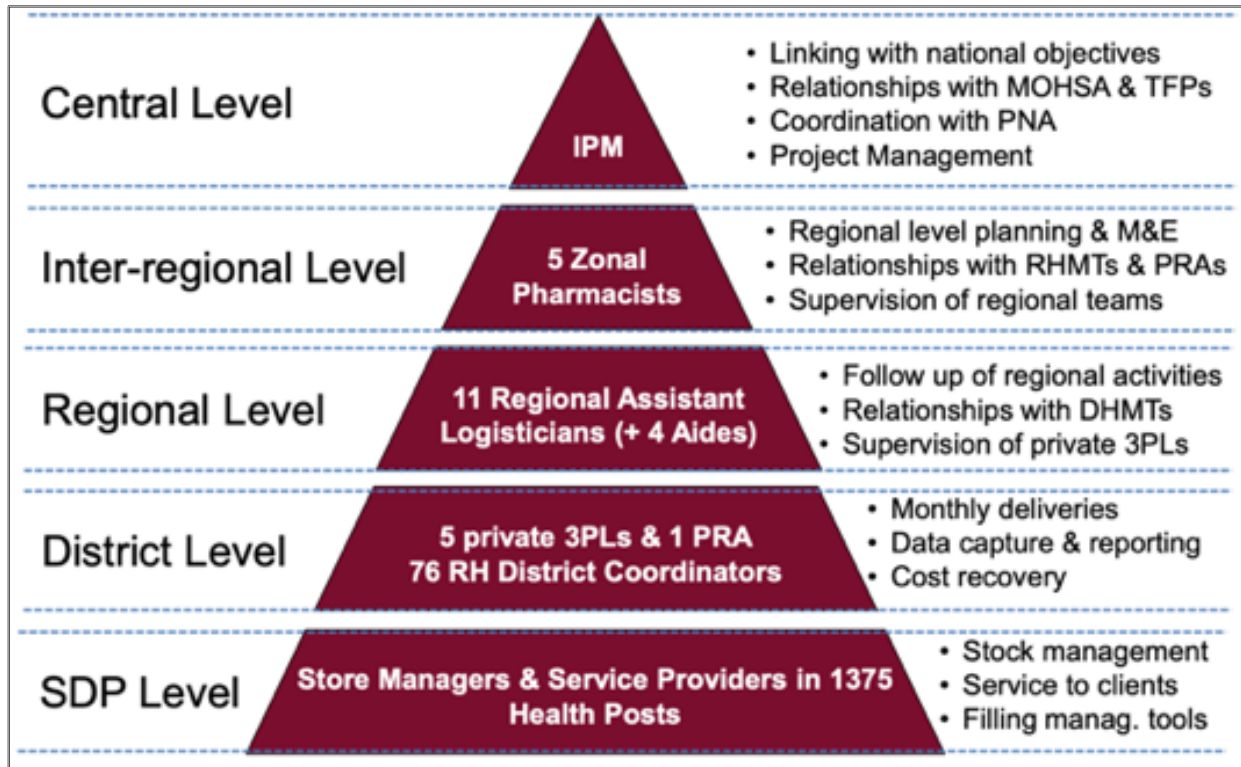
Exhibit 2 Senegal Supply Chain, PNA (2010)



Note: At the national level: PNA delivers health products to PRAs every month. A monthly regional distribution plan is established every month to ensure the availability of stock in its network. At the regional level: The districts obtain their supplies (monthly) from the PRAs in their respective regions after payment of the corresponding invoice. At the peripheral level: The SDPs regularly get their supplies from the district depots in their area of responsibility according to needs, cash flow, and product availability.

Source: African Resource Center

Exhibit 3 Organizational Chart for IPM-3PL (2013-2015)



Source: IntraHealth International

Exhibit 4 *Key Performance Indicators Used for the 3PLs*

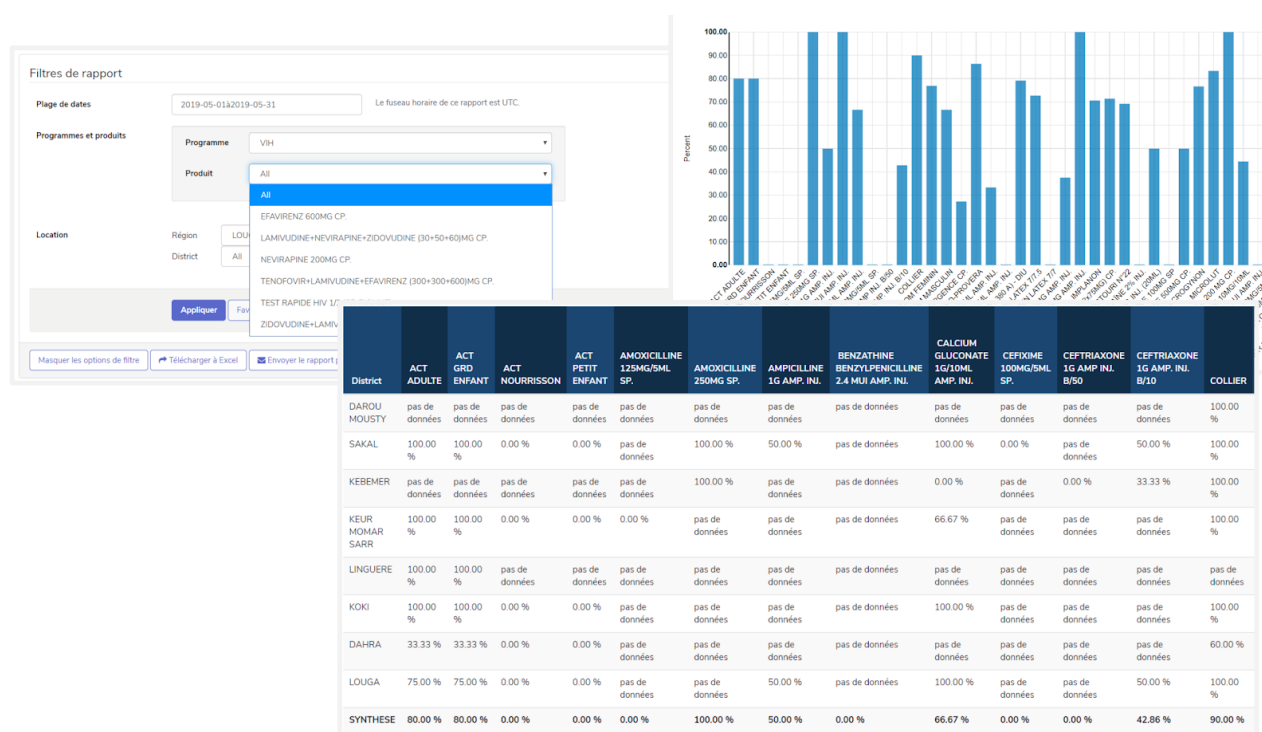
| Indicators | Description | Calculation Method | Targets | Frequency | Sources |
|---|---|--|---|----------------|---|
| 1. SDP coverage rate | This indicator measures the percentage of SDPs served by the operators in a month | (Number of SDPs served/Total number of SDPs in a region)*100 | <u>Case 1:</u> Two-service round regions Period: April-June 2018 50% Period: July-September 2018 100% <u>Case 2:</u> One-service round regions Period: April-September 2018 100% | Monthly | CommCare Delivery Summaries Narrative reports |
| 2. Data entry rate (in CommCare Log) | This indicator measures the percentage of served SDPs with data effectively entered in the system for a given period | (Number of SDPs served with data effectively entered/Total number of SDPs in a region)*100 | 100% | Monthly | CommCare Delivery Summaries Narrative reports |
| 3. Delivery summaries | This indicator measures the percentage of delivery summaries produced and shared with PNA and IntraHealth | Number of delivery summaries produced and shared/Number of delivery summaries to be produced and shared between April and September 2018 | Produced and shared 100% | | IntraHealth/PNA |
| 4. Monthly workplan | This indicator measures the percentage of delivery plans produced and shared with the technical team for validation | Number of delivery plans produced and shared/Number of delivery plans to be produced and shared between April and September 2018 | Produced and shared 100% | Monthly | IntraHealth/PNA |
| 5. Narrative reports | This indicator measures the percentage of narrative reports produced and shared with PNA and IntraHealth between April and September 2018 | Number of narrative reports produced and shared/Number of narrative reports to be produced and shared between April and September 2018 | Produced and shared 100% | Monthly | IntraHealth/PNA |

Source: African Resource Center

Exhibit 5a *CommCare Dashboard – A List of Available Reports*

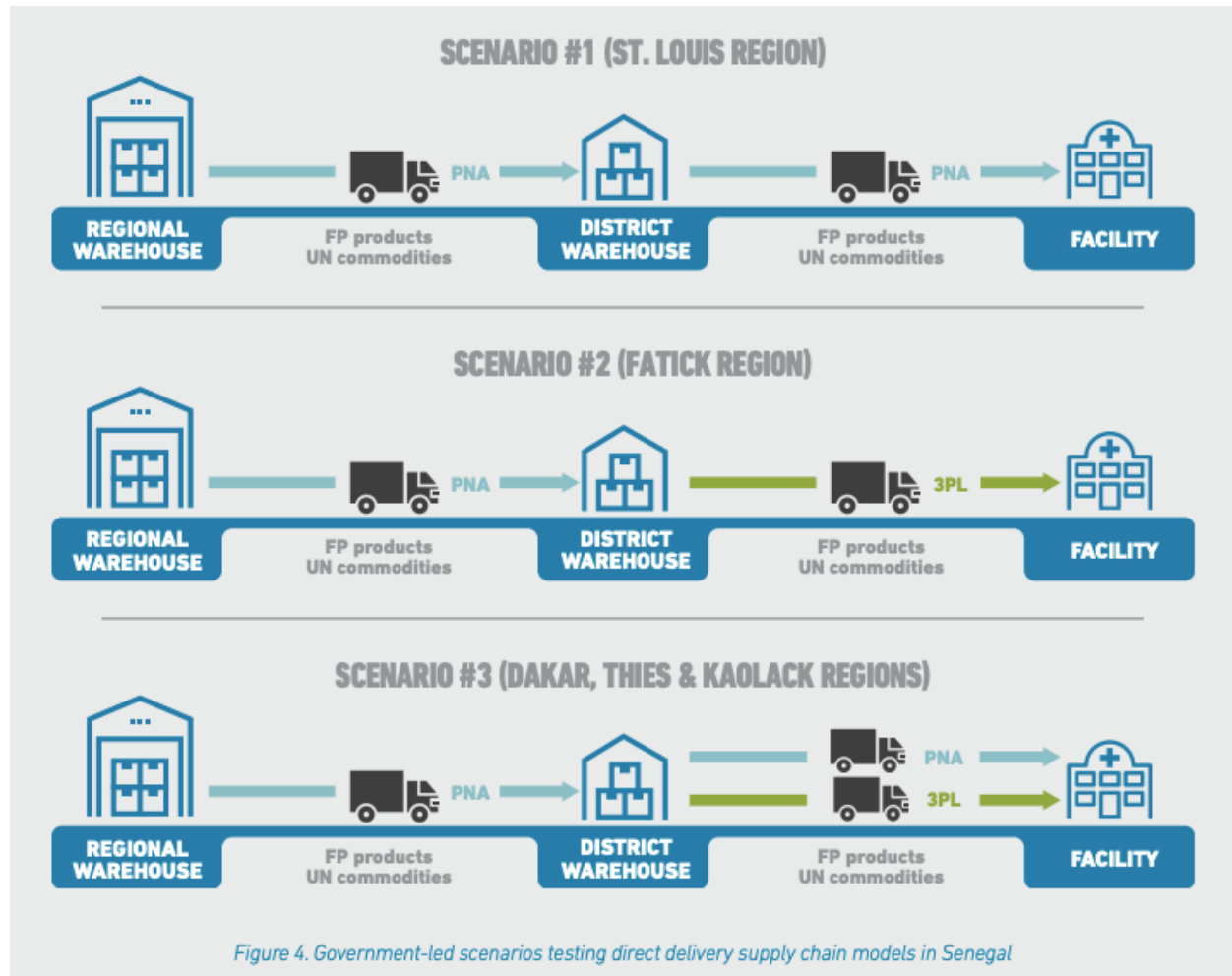
| Reports | Description |
|------------------------------------|---|
| Availability of products | Number of PPSs with one or more products available/Number of PPSs visited |
| Consumption by product | Number of products consumed |
| Loss rate by product | Total number of PNA products lost (*excluding expired products)/Final PNA inventory |
| Expiry rate by product | Value of expired ANP products/Value of ANP ending stock |
| Fulfillment rate by product | Quantity of products delivered/Quantity of products ordered |
| Value of available ANP inventories | Assessment of the available ending stock |

Exhibit 5b *CommCare Dashboard – Availability of Products*



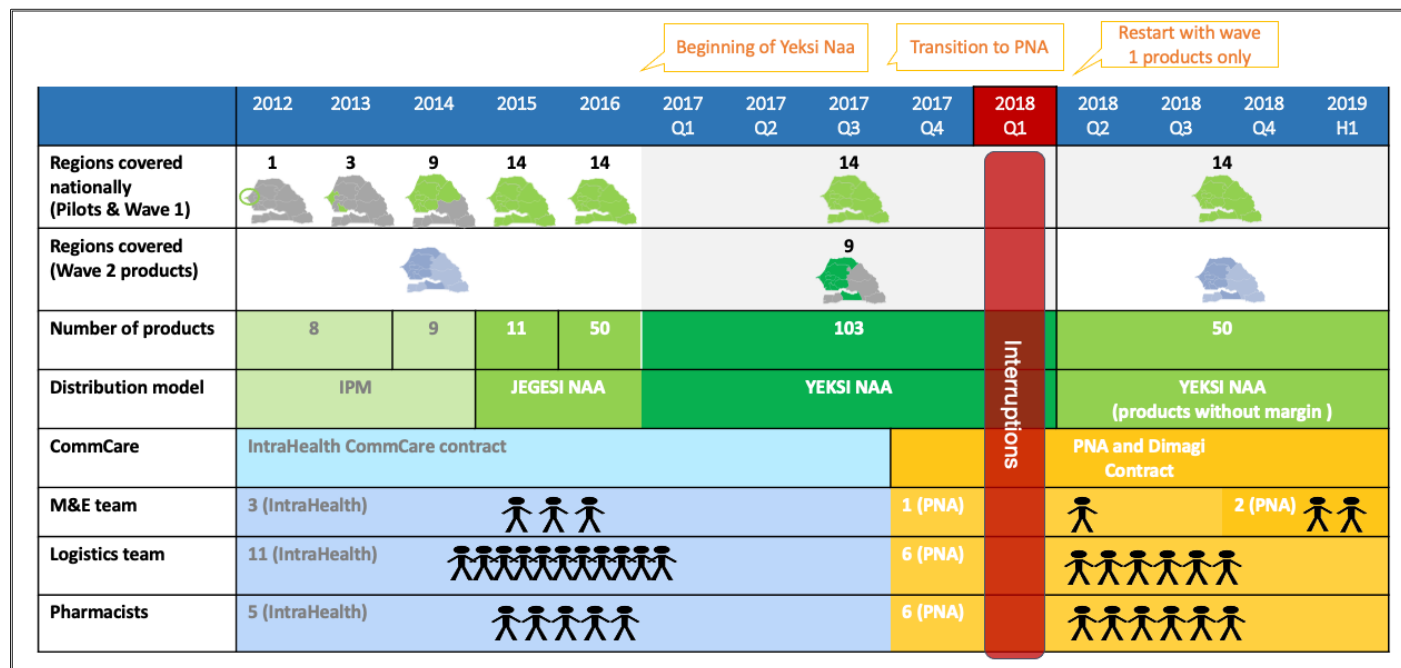
Source: Dimagi

Exhibit 6 Supply Chain Scenarios



Source: Providing Reliable Last Mile Access to Contraceptives and Other Essential Medicines: The Informed Push Model with Third Party Logistics Providers in Senegal. Merck for Mothers. 2017. https://www.merckformothers.com/docs/Senegal_IPM-3PL_English_Merck_Final.pdf

Exhibit 7 Timeline (2012-2019)



Source: African Resource Center

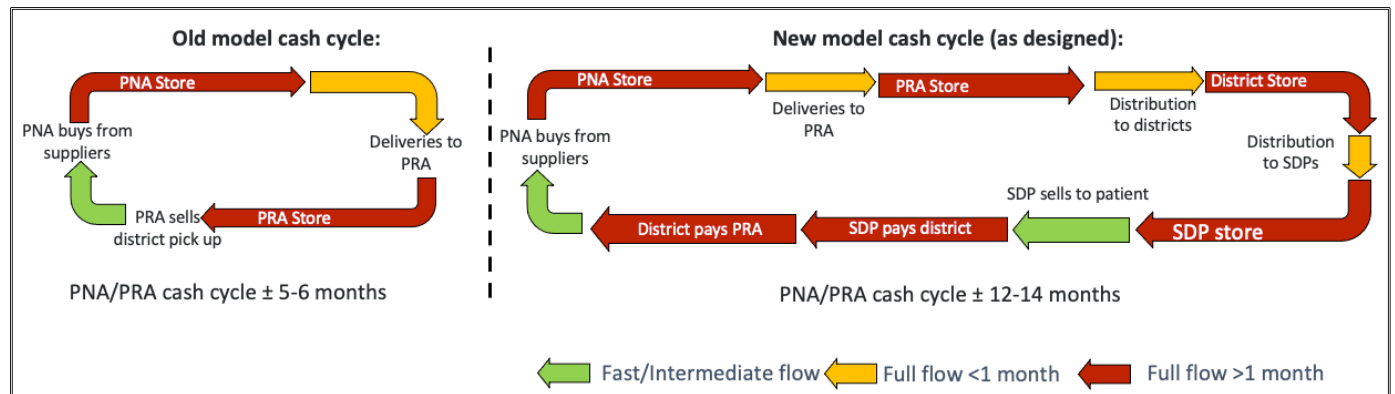
Exhibit 8 Comparison of Program Contributions and Estimated Costs (USD)

| Programs | 2018 sales | Logistics cost | Amounts recieved | Occupied area (m2) | Price m2 | Storage costs | Logistics costs |
|--------------------------|------------|----------------|------------------|--------------------|----------|---------------|-----------------|
| AIDS | 3,866,591 | 3% | 121,800 | 1,000 | 42,000 | 77,420 | 199,219 |
| Malaria | 2,785,794 | 3% | 97,264 | 1,000 | 42,000 | 77,420 | 174,683 |
| Family planning products | 940,096 | 3% | 28,203 | 2,000 | 42,000 | 154,839 | 183,042 |
| Tuberculosis | 918,916 | 3% | 27,567 | 500 | 42,000 | 38,710 | 66,277 |
| | | | 274,834 | | | 348,389 | 623,221 |

Note: McKinsey & Company estimated that the health programs should contribute more to the financing of the storage and distribution by increasing their participation to 10% of turnover. The programs refused and continued to pay the 3%. This structural gap in McKinsey's modeling constitutes a gap for the financial sustainability of the Yeksi Naa model.

Source: African Resource Center

Exhibit 9 Cash Cycle



Note: In this illustration, the diagrams refer only to the chronological impact of additional storage and payment delays. To convert the volume of consignment stock into cash, the cost of products * the volume of products is important to assess the size of the risk for the PNA. For example, for drugs in the free program, the impact is negligible, as no cash expenditure is required by the PNA.

Source: African Resource Center

Exhibit 10 *Executive Summary: Recommendations***1. Consolidate the Governance of the Supply Chain**

The supply chain is a key element of UHC and should be managed by an interdepartmental governance structure capable and empowered to align supply chain strategy with health policy. Ministries should be represented, knowing that supply chain issues should be part of strategic planning and include UHC, health programs, regional, district and primary health care. MSAS is expected to lead the governance of the supply chain, in terms of overseeing PNA operations, as well as strategic investment planning.

2. Create Centralized Financing for Distribution

In collaboration with other ministries, the MSAS should put in place centralized funding to cover the needs of patients, including distribution costs of 3PLs and freebies in the context of UHC. The current link between the value of products sold at district and SDP level and their contributions toward logistics costs should be reconsidered (redistribution of margin) for more consistency.

3. Develop End-to-End Visibility Strategy

A thorough review of the existing information system is needed to create an investment roadmap to provide granular data to analyze the necessary processes and financial flows across the supply chain. These investments aim to establish a cause-and-effect link between activities and supply chain performance and provide agility for the required decision-making.

4. Establish a Planning Center of Excellence

Create a supply chain planning department within MoHSA to inform supply chain policy, as well as operational decisions (e.g., forecasting, inventory management, segmentation). An operational model design activity should determine how the planning center, the governance mechanism recommended above, and other actors interact with each other.

5. Network Optimization*

A network optimization study is a top priority, with a specific focus on identifying the appropriate warehouse level to jump. (This leading practice is to reduce (distribution) levels in order to reduce complexity and logistics costs, as well as to improve the speed of information and financial flows).

* This study is urgent as its results will inform pricing and funding strategy, IT roadmap, and process design for the Demand Planning Center of Excellence.

Source: African Resource Center

References

1. The World Bank Group. Senegal | Data - World Bank Data. The World Bank. <https://data.worldbank.org/country/SN>. Published 2021. Accessed April 25, 2021.
2. Simpson A. *Language and National Identity in Africa*. Oxford University Press; 2008.
3. Central Intelligence Agency. Africa: Senegal. The World Factbook. <https://www.cia.gov/the-world-factbook/countries/senegal/>. Published April 20, 2021. Accessed April 26, 2021.
4. Torres C, Briceno-Garmendia C, Dominguez C. Senegal's Infrastructure: A Continental Perspective. *Open Knowledge Repository - The World Bank Group*. September 2011. <http://hdl.handle.net/10986/3579>. Accessed April 26, 2021.
5. Kurtz DM. Political integration in africa: The Mali federation. *J Mod Afr Stud*. 1970;8(3):405-424. doi:10.1017/S0022278X00019923
6. Galvan DC. Political turnover and social change in Senegal. *Journal of Democracy*. 2001;12(3):51-62. doi:10.1353/jod.2001.0047
7. The Economist Intelligence Unit N.A., Incorporated. Senegal: Country outlook. EIU ViewsWire. <http://search.proquest.com/docview/1478019843/abstract/8229F4BBD3443BCPQ/1>. Published January 17, 2014. Accessed April 26, 2021.
8. Sar M. In Senegal, President Macky Sall favored to win re-election. Atlantic Council. <https://www.atlanticcouncil.org/blogs/new-atlanticist/in-senegal-president-macky-sall-favored-to-win-re-election/>. Published February 21, 2019. Accessed April 26, 2021.
9. Ministry of Health and Social Action. Senegal Ministry of Health and Social Action. Pyramid of Health. <http://www.sante.gouv.sn/politique-de-sante/pyramide-de-sant%C3%A9>. Accessed April 26, 2021.
10. SHOPS Plus. *Cartographie du Secteur Privé de la Santé au Sénégal 2016-2017*. USAID; 2018.
11. Heyen-Perschon J. *Report on Current Situation in the Health Sector of Senegaland and Possible Roles for Non-Motorised Transport Interventions*. Institute for Transportation & Development Policy; 2005. <https://itdpdotorg.wpengine.com/wp-content/uploads/2014/07/ITDP-Transport-and-Health-Care-Senegal.pdf>. Accessed April 26, 2021.
12. Leslie HH, Spiegelman D, Zhou X, Kruk ME. Service readiness of health facilities in Bangladesh, Haiti, Kenya, Malawi, Namibia, Nepal, Rwanda, Senegal, Uganda and the United Republic of Tanzania. *Bull World Health Organ*. 2017;95(11):738-748. doi:10.2471/BLT.17.191916
13. Daff BM, Diouf S, Diop ESM, et al. Reforms for financial protection schemes towards universal health coverage, Senegal. *Bull World Health Organ*. 2020;98(2):100-108. doi:10.2471/BLT.19.239665
14. Lepine A, Le Nestour A. The determinants of healthcare utilisation in rural Senegal. *J Afr Econ*. 2013;22(1):163-186. doi:10.1093/jae/ejs020
15. Poon L. Senegal's Pharmacies Are Much, Much Better Than Your Local Drugstore. *NPR*. <https://www.npr.org/sections/goatsandsoda/2015/02/10/377501447/senegals-pharmacies-are-much-much-better-than-your-local-drugstore>. Published February 10, 2015. Accessed April 26, 2021.
16. USAID. *Assessment of Health Related Investment and Financing Opportunities in Senegal*. USAID; 2015. https://pdf.usaid.gov/pdf_docs/PA00WHT8.pdf. Accessed April 26, 2021.
17. Vitale C. *Competition Issues in the Distribution of Pharmaceuticals: Contribution from Senegal*. Organisation for Economic Co-operation and Development; 2014. [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DAF/COMP/GF/WD\(2014\)41&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DAF/COMP/GF/WD(2014)41&docLanguage=En). Accessed April 26, 2021.
18. Camara G, Diallo AH, Lo M, Tendeng J-N, Lo S. A national medical information system for Senegal: Architecture and services. *Stud Health Technol Inform*. 2016;228:43-47.
19. World Health Organization. Health Expenditure Profile Senegal. Global Health Expenditure Profile.

- https://apps.who.int/nha/database/country_profile/Index/en. Accessed April 26, 2021.
20. World Health Organization. *Official Development Assistance for Health to Senegal*. World Health Organization; 2016.
 21. USAID. Health Financing Profile: Senegal. 2015.
http://www.africanstrategies4health.org/uploads/1/3/5/3/13538666/country_profile_-_senegal_-_us_letter.pdf. Accessed April 26, 2021.
 22. Agence de le Couverture Maladie Universelle. La CMU À Travers les Mutuelles de Santé. Agence de le Couverture Maladie Universelle. <http://agencecmu.sn/la-cmu-travers-les-mutuelles-de-sante>. Accessed April 26, 2021.
 23. Brunner B, Barnes J, Carmona A, et al. *Evaluation du Secteur Privé de la Santé au Senegal a Travers Quelques Exemples d'Offres de Produits et de Prestations de Services*. Projet Strengthening Health Outcomes through the Private Sector, Abt Associates Inc; 2016.
<https://www.shopsplusproject.org/sites/default/files/resources/Evaluation%20du%20secteur%20priv%C3%A9%20de%20la%20sant%C3%A9%20au%20Senegal%20a%20travers%20quelques%20exemples%20d%27offres%20de%20produits%20et%20de%20prestations%20de%20services.pdf>. Accessed April 26, 2021.
 24. Yadav P. *Integration of Vaccine Supply Chains with Other Health Commodity Supply Chains*. World Health Organization, PATH; 2013.
 25. Zan T. *Gaining Traction: Executing Costed Implementation Plans. Experiences and Lessons from Senegal*. FHI 360; 2017. <https://www.fhi360.org/sites/default/files/media/documents/senegal-brief-cip-english.PDF>. Accessed April 26, 2021.
 26. IntraHealth International. *Family Planning: An Investment in Francophone Africa's Future*. IntraHealth International; 2010. https://www.intrahealth.org/sites/ihweb/files/files/media/the-urban-reproductive-health-initiative-in-senegal/ISSU_Overview_English.pdf. Accessed April 26, 2021.
 27. Ouagadougou Partnership. Contraception in Ouagadougou Partnership Countries. Ouagadougou Partnership. <https://partenariatouaga.org/en/contraception-ouagadougou-partnership-countries/#>. Published 2017. Accessed April 26, 2021.
 28. Cavallaro FL, Benova L, Macleod D, Faye A, Lynch CA. Examining trends in family planning among harder-to-reach women in Senegal 1992-2014. *Sci Rep*. 2017;7:41006. doi:10.1038/srep41006
 29. Merck for Mothers. *Providing Reliable Last Mile Access to Contraceptives and Other Essential Medicines: The Informed Push Model with Third Party Logistics Providers in Senegal*. Merck for Mothers; 2017.

Appendix A *Abbreviations*

| | |
|-------|--|
| 3PL | Third Party Logistician |
| ARC | African Resource Center |
| IPM | Informed Push Model |
| MoHSA | Ministry of Health and Social Action |
| PNA | National Supply Pharmacy (Pharmacie Nationale d'Approvisionnement) |
| PRA | Regional Supply Pharmacy (Pharmacies Régionales d'Approvisionnement) |
| SDP | Service Delivery Points |
| UHC | Universal Health Coverage |

Appendix B *Definitions*

| Concept | Definition |
|-----------------|---|
| IPM | The Informed Push Model (IPM) approach, implemented in Senegal since 2012, aims to increase the availability of health products at the level of health structures by improving the functionality of the supply chain through contracting with private professional operators. These ensure the delivery of contraceptive products in sufficient quantity and the collection of data on time to effectively meet the demand of users of health services. |
| Jegesi Naa | PNA initiative that consists of making health products available up to the health district level. This can be consignment or the sale of cost recovery products. |
| Yeksi Naa | PNA initiative that consists of making health products available to the SDPs. |
| Operators (3PL) | 3PL logistics providers (third-party logisticians) are private contractors that ensure the distribution of health products from a regularly installed warehouse (district or regional hospital) to the SDPs. |
| Margin | The profit margin is the difference between the selling price and the cost price of health products; it is governed by an order of the Minister of Health. |
| Revenue | The revenue, in accounting, is the sum of money collected (received) following the sale of health products by the PPS or district custodian. |
| Wave 1 | Integration of about 50 products from the LNME (National List of Essential Medicines) priority at the national level (FP, TB, HIV, malaria). |
| Wave 2 | Integration of about 100 LNME products gradually across the country (integration of wave 1 and generic essential medicines) |
| Cost Recovery | A form of health financing based on "community" participation since the failure of free policies and through the Bamako Initiative in 1987. |

Source: African Resource Center Evaluation