

Supply Chain Design:

Options to Address Common Challenges

Well-performing supply chains play a fundamental role in improving access to lifesaving products for all. However, supply chains can be a weak point in the system, and often are stretched beyond their ability to reach all people equitably. Supply chain designs in many countries follow government administrative tiers, which may not be effective or the most efficient way to deliver health commodities. In order for the supply chain to be effective under such a design, each tier must have the infrastructure necessary, including warehousing facilities, cold chain equipment, transportation assets, funding and human resources. When limitations in infrastructure, funding or human resource capacity exist within any administrative tier, supply chain performance will suffer.

For example, if a tier with limited transportation or cold chain capacity is responsible for product distribution, that tier will likely not be able to resupply at appropriate frequencies. These challenges can result in ad hoc solutions that overburden staff or compromise quality and efficiency. Products are distributed during other trips—such as infrequent supervision visits. More often, health care workers are forced to travel long distances to pick up products from a higher level of the supply chain, rather than receiving them at the service delivery point.

Limitations in supply chain infrastructure can lead to:

- Late, incomplete or unreliable resupplies, causing stockouts of products
- High transportation and storage costs
- Increased risk of spoilage or damage during transport
- Significant burden on health care workers in time and money
- Reduced access to health care workers when they travel to pick up products

Over the past 20 years, VillageReach has worked with governments to design and implement supply chains that reduce costs and improve product availability without the need for major infrastructure investments. VillageReach has identified five promising design options that address common supply chain challenges, even for the hardest-to-reach communities. Our experience shows that health and EPI programs can implement one or more of these options, tailored to the country context.

Supply chain design options:

Direct Delivery

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Level Jumping

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Resource Sharing

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Resupply Frequency

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Direct Delivery: Bringing Products to Health Facilities and Beyond



Direct delivery organizes and consolidates responsibility for product transport within a level of the system with the human and financial resources and the storage and transportation assets necessary to deliver products reliably to service delivery points. A promising practice is shifting responsibilities away from overworked health workers to dedicated logistics personnel who work solely on supply chain and logistics tasks. Consolidating logistics tasks to dedicated logisticians also improves data quality and availability by allowing these trained logisticians to focus full-time on what they have been trained to do. Direct delivery is frequently done through bypassing other administrative tiers (see level jumping).

Benefits of direct delivery:

- Reduces transportation costs by streamlining deliveries and optimizing routes.
- Reduces wastage by minimizing handling and transportation of products.
- Improves the quality of distribution by consolidating distribution management within a trained resource that is procedurally compliant.
- Reduces the time that healthcare workers spend away from service delivery points to pick up products, enabling them to spend more time on patient care.

Consider direct delivery when:

- Lower levels of the system do not have the infrastructure or capacity to deliver products routinely.
- Upstream levels have sufficient capacity and access to the financial resources needed to deliver routinely.
- A significant number of health facility staff must travel long distances to pick up products, exposing products like vaccines to risk, and requiring staff to be away from serving people at the health facility.

Additional considerations:

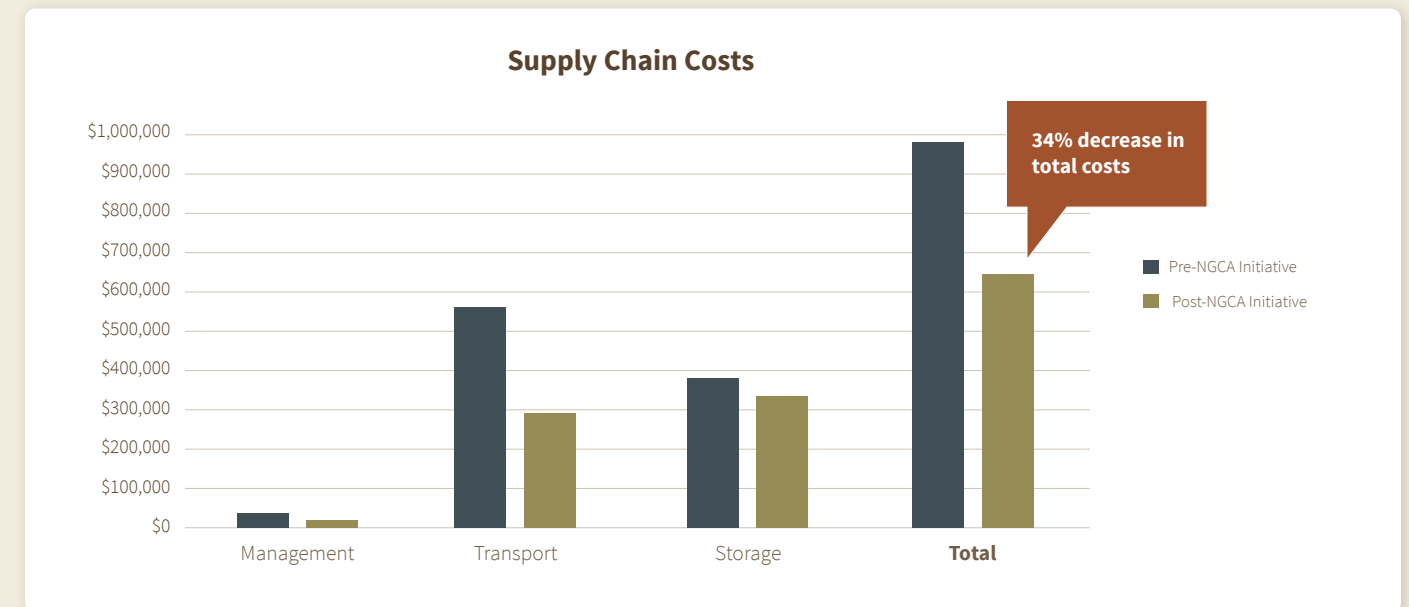
- Consolidating transportation upstream may require additional training, as well as an initial investment in additional storage, cold chain equipment or vehicles.
- Funding must match the distribution model and may require changes in policy, budgeting and financial flows.

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CASE STUDY 1

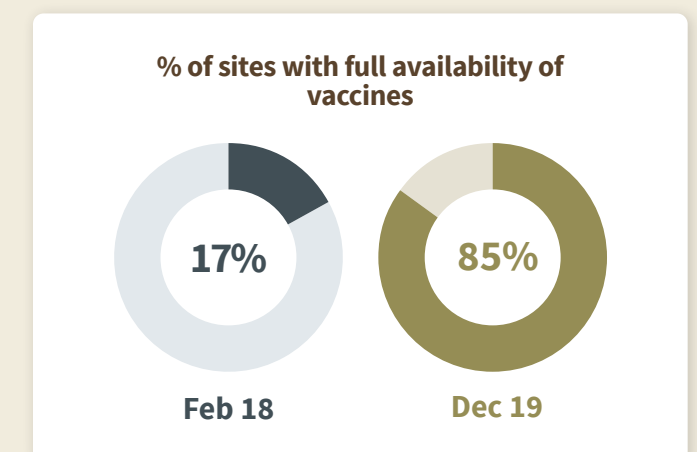
Direct Delivery, Level Jumping and Resource Sharing in Equateur, DRC¹

Over the course of a year, three zones in Equateur Province, the Democratic Republic of Congo, transformed the last mile delivery of products through (1) level jumping, (2) direct delivery, and (3) resource sharing, in addition to making other programmatic improvements. Under this Nouvelle Génération des Chaînes d'Approvisionnement (NGCA) Initiative, products are delivered from the provincial warehouse directly to a subset of health centers with cold chain equipment, relieving both zone staff and health workers from days of traveling each month to collect products. In addition, under NGCA, family planning products and generic and essential medicines are combined with shipments of vaccines, which only use 5 to 14 percent of transportation capacity on each distribution.



The implementation of NGCA improved product availability and efficiency of the supply chain. Prior to NGCA, immunization services had been compromised by stockouts across the province and in each of the three health zones. In Bolomba, for example, stockouts occurred 11 times in the six months prior to the NGCA Initiative, according to an independent study by the consulting firm Acasus. After the NGCA Initiative was implemented, stockouts over a six-month period dropped to zero in all three NGCA zones. The average monthly consumption of vaccine doses increased by 22 percent in each of the three health zones supported by VillageReach, compared to 4 percent in other health zones. In addition, vaccine supply chain costs decreased by 34 percent (see figure above), driven in large part by a 40 percent reduction in transport costs.

One of the most notable changes is that almost two years after the NGCA Initiative was implemented, the percent of sites with full availability of vaccines had increased dramatically (see figure below).



¹ [Increasing Access to Health Products in the DRC: Creating a more efficient, effective and resilient supply chain with the Next Generation Supply Chain Initiative.](#)

Level Jumping: Streamlining the Supply Chain



Level jumping removes a storage tier or tiers from the supply chain, such as eliminating or reducing warehousing at the district level. This is often implemented in conjunction with direct delivery. For example, deliveries can go directly from the province or state level to the service delivery point, bypassing any other intermediate levels such as the district. Even when bypassed, however, the lower levels may remain actively involved in supervision and can be used as a cross-docking location or to store safety/buffer stocks.

Benefits of level jumping:

- Reduces management costs and the costs of holding inventory by reducing the number of storage locations.
- Improves accountability by focusing inventory management on fewer storage locations.
- Reduces the number of times products are handled and transported from one storage location to the next, which minimizes the risk of damage.

Consider level jumping when:

- There is limited storage and/or cold chain capacity in one of the supply chain tiers.
- There is a need to reduce the levels of storage due to infrastructure costs.
- There are limited or non-existent infrastructure resources (transportation, funding, etc.) in one of the supply chain tiers, which is impeding routine deliveries.

Additional considerations:

- Level jumping can result in longer transportation distances so risk to products must be evaluated.
- Consolidating transportation upstream may remove per diems or other compensation for health care workers, requiring change management
- Level jumping can spark concerns regarding removing a level of control and/or supervision, though administrative levels can redeploy assets to maintain sufficient quality.

CASE STUDY 2

Direct Delivery, Outsourcing and Resource-Sharing in Tete, Mozambique²

Provincial health authorities in Tete, Mozambique, with support from VillageReach established a reliable supply of medical products to health facilities by using outsourcing and integration to distribute immunization products and antiretrovirals (ARVs) at the lower levels of the supply chain. VillageReach and provincial government leaders selected and worked with a private sector third-party logistics (3PL) company. Supply chain modeling helped optimize route plans for the distributions, delivering products directly from the provincial warehouse to health facilities. Distribution of ARVs, which were previously set up in a parallel supply chain, were combined with vaccines. Staff receive on-the-job coaching and mentoring based on how they are carrying out the responsibilities in the MOU. Payment is based on completing the distributions as scheduled and documenting the deliveries. This motivates the 3PL to maximize its loads per trip and introduce new route plans that cut across district boundaries.

Outsourcing: Engaging the Private Sector



Outsourcing allows governments to transfer certain supply chain functions to the private sector, allowing each party to focus on its core competencies. A common type of outsourcing is to use third party logistics (3PL) providers for transport instead of government fleets, where a private provider of trucks and drivers is used to deliver products between two or more locations.

Benefits of outsourcing:

- Better reliability and improved logistics capabilities, which may increase costs but can be offset by reduced wastage and improved product availability.
- Reduced capital costs associated with government-owned infrastructure and equipment and reduced needs for maintaining these assets.
- Improved overall system performance through built-in performance incentives that ensure logistics operators provide effective and efficient services and prevent stockouts to win and keep their contracts.

Consider outsourcing when:

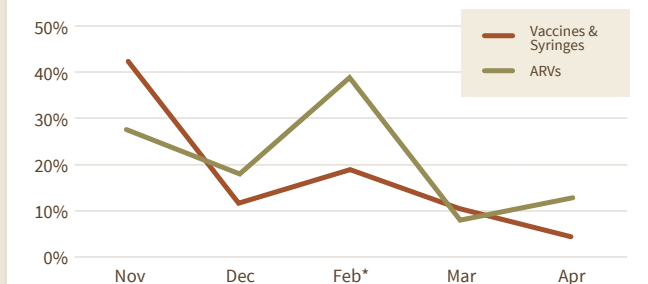
- Private sector supply chain operators are available and have capacity to operate supply chain functions.
- There is political will to move towards outsourcing and an active private sector in the country.
- The government has capacity needed to develop, negotiate, and manage contracts with outsourcing operators such as 3PLs (third party logistics) or 4PLs (fourth party logistics).

Additional considerations:

- Responsibility for supervising health care workers during product delivery or pick-up could be continued by the government or could be transferred to the 3PL, and should be specified in the contract.
- Performance-related payments are encouraged, with improved performance resulting in bonuses or underperformance attracting penalties.
- In addition to the contract, a service-level agreement is needed to describe specific practices, performance requirements and approaches to joint problem solving.

An assessment after six months of operation found an increase in product availability, improved efficiency, better data collecting and reporting and enhanced trust in the system. Stockouts of vaccines decreased from 42 percent in the first month to 4 percent, and ARV stockouts decreased from 27 percent to 7 percent. More efficient routes and better logistics planning have decreased the time and cost (vehicle, fuel, allowances) associated with freight delivery of health products. Distances traveled were reduced by as much as 40 percent because of direct distribution to health facilities and new route paths designed to cut across districts. Distribution times were also reduced significantly; distributions from the province warehouse to health facilities in the initial five districts were being completed in one week, whereas it previously required a full month for the commodities to move from the warehouse to the health facilities in those same districts.

Percentage of Items Out of Stock at Time of Offloading



*No distributions were conducted during January 2016 – this was intentional and agreed with Tete DPS in advance to ensure distributions were not compromised during anticipated heavy rains.

² [Outsourcing Transport to Improve Health at the Last Mile: A Case Study.](#)

Resource Sharing: Integrating Health Supply Chains



Resource sharing, often referred to as integration, among different supply chains can be adopted for specific supply chain functions, such as warehousing or transportation. Governments in countries like Mozambique are beginning to consider resource sharing across disease areas and funders, and this can be especially effective for hard-to-reach communities. For example, immunization products may be transported in the same vehicles as HIV or family planning products, but continue to have distinct systems for other supply chain functions, such as reporting and procurement.

Benefits of resource sharing:

- Avoids duplication of infrastructure requirements and management activities, resulting in a more efficient use of resources.
- Can reduce the cost of operations by avoiding redundancies in cost drivers like storage, distribution and labor.
- Contracts / MOUs can make accountability mechanisms explicit and enforceable, resulting in improved quality assurance and higher levels of performance.

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Consider resource sharing when:

- There are limited resources (e.g., transport, human resources) available for a specific program or programs.
- There is opportunity to coordinate supply chain planning to more efficiently distribute excess inventory.
- There is excess space in transportation for any products being delivered.
- There is a clear duplication of efforts and an identifiable opportunity to share.

Additional considerations:

- Programs and policies should be reviewed to ensure there are no logistical constraints that would affect resource sharing, such as differing resupply frequencies or specialized training or infrastructure requirements.
- Responsibility and/or liability for product safety and quality during transportation and storage should be discussed amongst the involved programs, and clear governance should be established.
- Supply chain and logistics costs must be discussed and allocated amongst the different programs.
- Developing shared cost principles and separated reporting lines among programs are valuable ways to support resource sharing.

Resupply Frequency: Optimizing Distribution Timing



Resupply frequency involves reviewing factors including distance, geography, lead times, storage capacity and demand to determine the optimal frequency of distribution for a set of health facilities in an area or region. Transport time and costs should also be considered. A system design analysis can help illustrate these trade-offs.

Benefits of changing resupply frequency:

- Improves efficiency by optimizing distributions for storage and transportation capacity.
- Optimizes the capacity of health facilities and interim storage locations.
- Allows more rapid movement, and therefore stock turn, reducing the risk of expiry.

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Consider changing resupply frequency when:

- There is appropriate transportation capacity to deliver based on the determined frequency.
- There is poor access and infrastructure in certain regions of the country, preventing frequent delivery.
- There is appropriate cold chain capacity, at the delivery point, to store products for a longer period of time if a reduced frequency of distribution is adopted.

Additional considerations:

- Level jumping can result in longer transportation distances so risk to products must be evaluated.
- Consolidating transportation upstream may remove per diems or other compensation for health care workers, requiring change management
- Level jumping can spark concerns regarding removing a level of control and/or supervision, though administrative levels can redeploy assets to maintain sufficient quality.

IN CONCLUSION

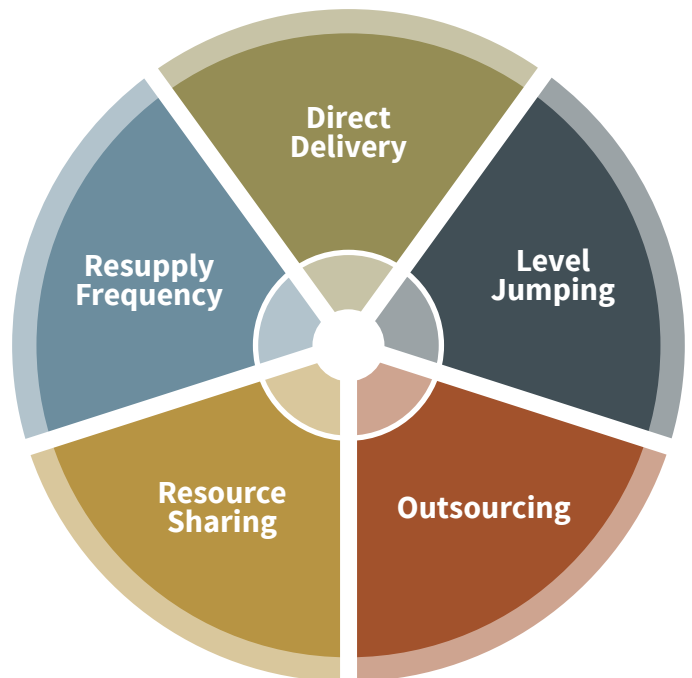
Design changes can drive dramatic improvements



Many LMICs continue to experience high levels of stockouts for vaccines and other critical health products at the point of service delivery, leading to service interruption for those people who rely on them.³ Changing the design of the supply chain can help improve product availability and improve its performance and efficiency.

VillageReach's experience over the past 20 years shows that there is a basic menu of design options to optimize supply chains that result in dramatic improvements in performance.

Although each program will need to customize the supply chain design to the needs of the environment, these options—direct delivery, level jumping, outsourcing, resource sharing, and resupply frequency—are feasible even in environments with limited infrastructure, where health facilities are far from resupply points, and where data is lacking or unreliable.



³ Lydon, P., et al., *Vaccine stockouts around the world: Are essential vaccines always available when needed?* *Vaccine*, 2017. 35(17): p. 2121-2126.

Additional Information

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