**Alliance for Health Logistics Systems**

# Characterization of the Supply Chains for Medicines and Medical Supplies in Latin America

January 2015

Decades of technical assistance to improve medicine supply chains in Latin America have left experiences, methodologies, and tools that are not being sufficiently shared among countries to strengthen the knowledge of decision makers who are undertaking reforms in their supply systems. The Alliance for Health Logistics Systems in Latin America (Alianza para Sistemas Logísticos en Salud de América Latina, or ASLAL) has the objective of promoting more efficient management of medicine supply chains in the region. The partners that make up the Alliance hope to contribute to filling this void by sharing, in a cost-effective manner, knowledge that is already available and ongoing experiences.

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# ACRONYMS AND ABBREVIATIONS

ASLAL  Alliance for Health Logistics Systems in Latin America
     (Alianza para Sistemas Logísticos en Salud en América Latina)
DCP   disease control program
UNGSM  National Pharmaceutical Supply Management Unit
     (Unidad Nacional de Gestión de Suministro de Medicamentos)

# BACKGROUND

In the region of the Americas different modes of organization are used for medicine supply chains. Some are in the process of transformation as a product of sectoral reforms or decentralization of public administration. However, until now no systematic characterization of the supply chains has been made based on standardized categories. In the absence of this information, the decision makers responsible for the transformations in these countries find themselves without tools for recognizing and comparing the base situation and recording the implications of the changes.

This rapid study, coordinated by the Alliance for Health Logistics Systems in Latin America (Alianza para Sistemas Logísticos en Salud en América Latina, or ASLAL), starts from a taxonomic proposal agreed upon by its members for the purpose of characterizing the medicine supply chains in the Americas based on standardized categories.

# METHODOLOGY

In the absence of methodologies that characterize medicine supply chains in a systematic and comparable manner, representatives from different member institutions of ASLAL agreed upon the categories, variables, and operative definitions that are presented in figure 1 and annex 1. The achieved consensus was based on available definitions in literature on the subject[1] and the experience of expert consultants in medicine supply.

It was agreed that the characterization of a supply chain should include two components:

- **The organizational and operative characteristics that identify it**: The institutional affiliation, the concentration or deconcentration of its functions, the integration or *verticality* of supply , the center-periphery model of distribution, and the level of regulation by the State

- **The results that they obtain**: The information the system produces for supporting decision making, the availability of medicines at the end of the chain, and the cost of logistics operation contrasted with reference information[2]

The agreed upon categories and operative definitions were organized in a data collection instrument (annex 1) that would allow the informants to mark the option that best characterizes the medicine supply chain in their country. In some categories, such as *mixed* concentration of functions and *mixed* integration, informants were asked to specify the components of the supply chain as centralized or decentralized, and integrated or vertical, respectively.

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[1] Management Sciences for Health. MDS-3: managing access to medicines and health technologies. 3rd ed. Arlington, VA; Management Sciences for Health; 2012. 1,088 p.
[2] John Snow Inc. Getting products to people: the JSI framework for integrated supply chain management in public health. Arlington, VA: John Snow Inc.; 2012 Jan.
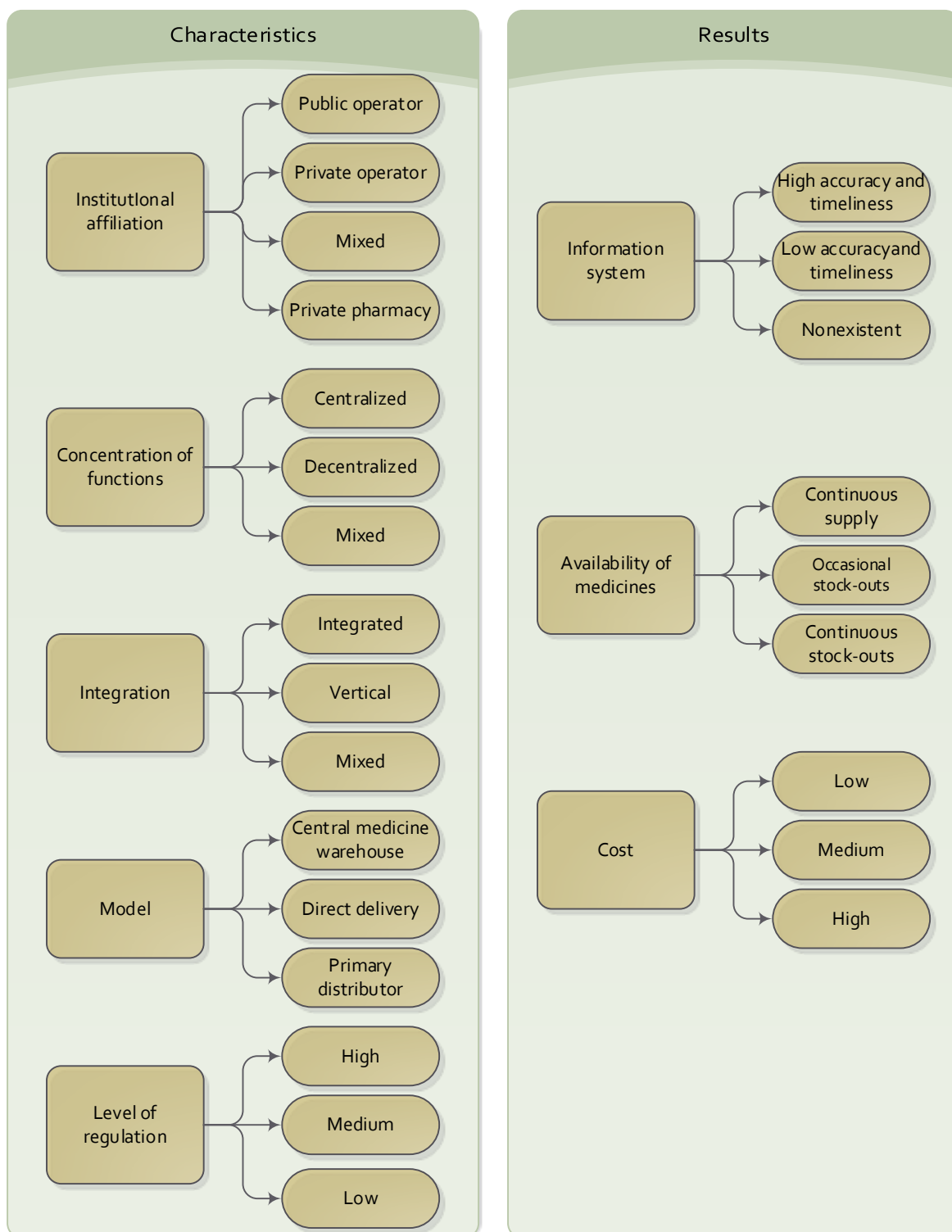
**Figure 1. Categories and variables agreed upon for the characterization of medicine supply chains in Latin America**

The forms were completed by the coordinators of the national medicine supply management units (unidades nacionales de gestión de suministro medicamentos, or UNGSM) of the ministries of health (or their equivalent), or by members of the Alliance with knowledge of the supply chain of a particular country. In this second case, the information obtained was checked with and validated by the coordinator of the UNGSM.

The information from the 11 countries was collected between August and October 2014.[3]. None of the informants objected to the methodology nor the suitability of the categories and definitions agreed upon.

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[3] The countries are Bolivia, Brazil, Colombia, the Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, and Peru.

# RESULTS

The 11 forms received include information from Meso-American (El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Panama), Caribbean (Dominican Republic), and South American (Bolivia, Colombia, and Peru) countries.

Several of the countries included in the sample group were in the process of transforming their supply chains (Dominican Republic, Guatemala, Honduras, and Panama). The proposed changes were in the planning phase or early phases of implementation. The consolidated results, therefore, reflect the situation at the moment the information was gathered (August to October 2014) and not the desired outcome.

Figure 2 presents the observed situation. Each bar represents the percentage of countries that exhibit a particular characteristic in their supply chain.
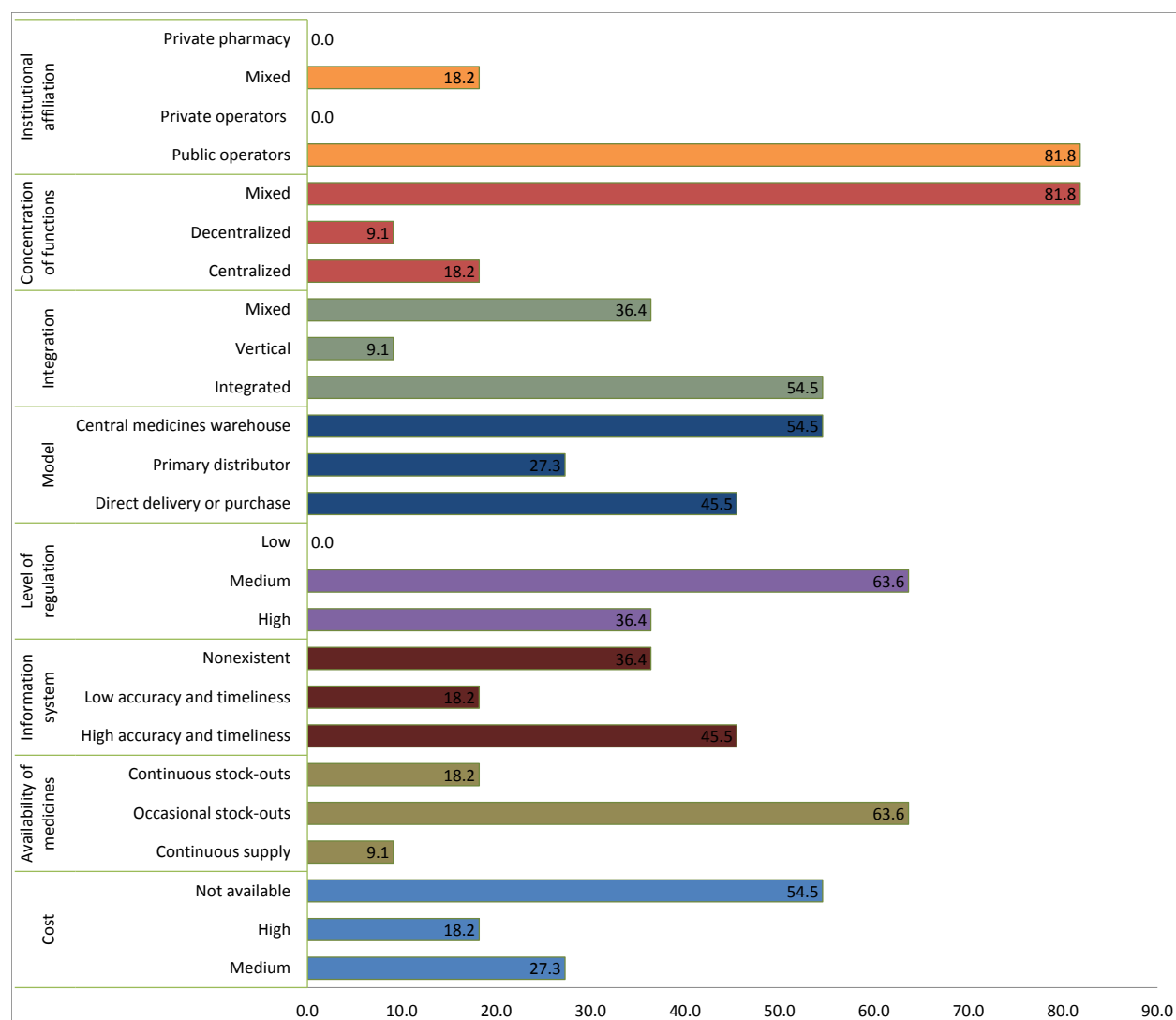
**Figure 2. Profile of medicine supply chains in Latin America (%, n = 11)**

Thus, and with the limitations imposed by the sample size and a methodology that is being tested for the first time, it is possible to characterize, as tendencies, the medicine supply chains in the Americas in the following form:

- **Managed by public operators**: In most of the countries (9 of 11), the operators of the supply chain are State institutions (table 1). The two countries that reported private participation (Colombia and Dominican Republic) began sectoral reforms several years ago that promote free competition in the allocation of resources and/or transferring the decision to contract third parties to decentralized, autonomous bodies.

**Table 1. Operators**

| | |
|---|---|
| **Public operators** | *All or most of the supply chain operators are State institutions.* |
| | Bolivia, Brazil, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru |
| **Private operators** | *Although funding is public, all or most operators are private, contracted agents.* |
| | None |
| **Mixed** | *Public operators are responsible for some functions (storage, for example), whereas other private operators are responsible for others.* |
| | Colombia, Dominican Republic |
| **Private pharmacy** | *All of the medicines financed by private insurance are commercialized by private operators and dispensed from private pharmacies.* |
| | None |

- **Combined centralized and decentralized functions (mixed)**: Only Bolivia has a completely decentralized supply chain. The rest have decentralized some components (in particular, transport from the department/region to the facilities) and maintained others as centralized (in particular, quality control). With the exception of Nicaragua, in most of the countries and for most of the components in the supply chain, a combination of centralized and decentralized functions exists. This *mix* is fundamentally dependent upon the type of product: the medicines and supplies for disease control programs (DCP; for example, tuberculosis, HIV/AIDS, malaria) are programmed, acquired, and distributed at the central level, meanwhile the rest of the medicines and supplies for noncommunicable conditions and pathologies are managed in a decentralized manner.

**Table 2. Centralization or Decentralization of Function**

| | |
|---|---|
| **Centralized** | *The central level coordinates purchases, customs clearance and storage, and transport to the periphery (region or department).* |
| | Nicaragua, Panama |
| **Decentralized** | *Purchases, storage, and distribution to health facilities are responsibilities of the departmental/regional level.* |
| | Bolivia |
| **Mixed** | *Purchases can be centralized, but the shipment is direct to the regions/departments, from where it is distributed to health facilities.* |
| | Brazil, Colombia,Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Panama, Peru |

**Table 3. Characterization of the Deconcentration of Functions**

| Functions | Brazil | | Colombia | | El Salvador | | Guatemala | | Honduras | | Mexico | | Peru | | Dominican Republic | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | D | C | D | C | D | C | D | C | D | C | D | C | D | C | D |
| **Programming** | ■ | | | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| **Purchase** | ■ | | | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ |
| **Quality control** | ■ | | | ■ | ■ | | ■ | | ■ | | ■ | ■ | ■ | | ■ | |
| **Storage** | ■ | ■ | | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | | | ■ |
| **Responsibility for transport (center to department/region)** | ■ | | ■ | | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | | ■ | |
| **Responsibility for transport to facilities** | | ■ | | ■ | | ■ | ■ | | | ■ | | ■ | | ■ | | ■ |

*Note:* C = centralized; D = decentralized.

- **Integrated**: Six of the 11 countries (Bolivia, Brazil, Colombia, Nicaragua, Panama, and Peru) declared that the medicines and supplies for DCP and for (chronic) communicable diseases use the same mechanisms for storage, inventory management, and transport. In four (Dominican Republic, El Salvador, Guatemala, and Honduras), the system was classified as *mixed*, given that although the tendency is toward integration, some functions (particularly programming and purchasing) are still the responsibility of the DCPs and not of the UNGSMs. In the processes of integration, the functions integrated early on are storage and transport.

**Table 4. Integration**

| Integrated | *Medicines and supplies for disease control programs (TB, HIV) and (chronic) noncommunicable pathologies use the same mechanisms of storage, inventory management, and transport.* |
|---|---|
| | Bolivia, Brazil, Colombia, Nicaragua, Panama, Peru |

| Vertical | *Medicines and supplies for disease control programs (TB, HIV) and (chronic) noncommunicable pathologies use different mechanisms of storage, inventory management, and transport.* |
|---|---|
| | Mexico |

| Mixed | *Some disease control programs have been integrated into a single system, whereas others keep their own warehouses, inventory management, and transport.* |
|---|---|
| | Dominican Republic, El Salvador, Guatemala, Honduras |

**Table 5. Characterization of the Integration of Functions**

| Functions | El Salvador | | Guatemala | | Honduras | | Dominican Republic | |
|---|---|---|---|---|---|---|---|---|
| | I | V | I | V | I | V | I | V |
| **Programming** | | X | | X | X | | X | |
| **Purchase** | | X | | X | X | | X | |
| **Quality control** | X | | | X | X | | X | |
| **Storage** | X | | X | | X | X | X | X |
| **Responsibility of transport (center to department/region)** | X | | | X | X | X | X | X |
| **Responsibility for transport to facilities** | X | | | X | X | | X | X |

*Note:* I = integrated; V = vertical.

- **Distribution model from a central medical warehouse**: In six countries, particularly those that are geographically small and without federal organization (Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, and Panama), the medicines are distributed from one or various central warehouses, under the administration of the public sector. In these countries, the regional warehouses or facilities usually "collect" medicines from the central warehouse because of a lack of an organized system of "delivery." In federal countries of greater geographic size (Bolivia, Colombia, Mexico), the products are acquired directly by decentralized bodies and transported to their warehouses by the commercial provider. In three countries (Brazil, Dominican Republic, and Peru), primary parastatal distributors at the central level carry out functions of acquisition, warehousing, and distribution, particularly for products used for DCPs.

**Table 6. Distribution**

| | |
|---|---|
| **Direct delivery or purchase** | *The products are bought at the regional, district, municipal, or other lower levels, and the products are collected by lower levels or delivered to regional, district, or municipal warehouses under the administration of the public sector.* |
| | Boliva, Colombia, Guatemala, Mexico, Peru |
| **Primary distributor** | *The medicines and supplies are watched over by and distributed from one or various central or peripheral warehouses under administration of a private operator contracted by the public sector.* |
| | Brazil, Dominican Republic, Peru |
| **Central medicines warehouse** | *The medicines and supplies are watched over by and distributed from one or various central warehouses, under administration of the public sector, from which transport to the periphery is coordinated.* |
| | Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, Panama |

- **Medium level of regulation**: Seven of the 11 countries (Bolivia, Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, and Panama) reported a medium level of regulation. In these countries, policies, laws, and standards exist that regulate the supply of medicines, but they are not observed because of a lack of public institutionalization. The responsible departments or units, for example, are not provided with the resources to complete these functions. In the four remaining countries (Brazil, Colombia, Nicaragua, and Peru), a high level of regulation was reported.

**Table 7. Regulation**

| | |
|---|---|
| **High** | *Policies, laws, and standards exist that regulate the supply of medicines. For example, price controls, facility certifications, and standardized procedures for the management of supplies exist, and they are observed. Public institutions (departments, units) are provided with the resources to carry out these functions.* |
| | Brazil, Colombia, Nicaragua, Peru |
| **Medium** | *Policies, laws, and standards exist that regulate the supply of medicines; however, they are not suitably observed, because of a lack of public institutionalization. The responsible departments or units are not provided with the resources to carry out these functions.* |
| | Bolivia, Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Panama |
| **Low** | *Policies may exist, but no laws and standards regulate the supply of medicines. For example, no price controls or facility certifications exist. Public institutionalization for regulation of medicine supply does not exist, nor is it required.* |
| | None |

- **High-accuracy and timely information systems:** Five countries (Bolivia, Brazil, Dominican Republic, Nicaragua, and Peru) were reported to have timely and accurate information systems for the decision-making process. These countries have information about availability at the health facility level and, by aggregation, in the intermediate and central levels. In El Salvador and Mexico, the existence of information systems was reported, but these still do not generate useful information for decision making. In four countries (Colombia, Guatemala, Honduras, and Panama), no information systems have been developed for the management of medicine supplies.

**Table 8. Information Systems**

| High accuracy and timeliness | *An information system (public or private) offers timely and accurate information to decision makers, at least in regard to consumption and stock availability at the health facility level and, by aggregation, at the national level.* |
|---|---|
| | Bolivia, Brazil, Dominican Republic, Nicaragua, Peru |
| Low accuracy and timeliness | *A designed and implemented information system exists (public or private), but the information is not useful for decision making because of its lack of timeliness and accuracy. The most accurate information that can be used is from the departmental or central warehouses.* |
| | El Salvador, Mexico |
| Nonexistent | *No information system (public or private) offers timely and accurate information to decision makers, at least in regard to consumption and stock availability at the health facility level and, by aggregation, at the national level.* |
| | Colombia, Guatamala, Honduras, Panama |

- **Occasional stock-outs**: In seven countries (Bolivia, Brazil, Colombia, El Salvador, Guatemala, Nicaragua, and Peru), occasional stock-outs are reported[4], and in two more (Honduras and Mexico), continuous stock-outs. These results cannot be entirely attributable to inefficiencies in the supply chain. Even with efficient procedures for planning, purchase, and distribution, the high levels of stock-outs could result from, for example, insufficient financing to cover what is needed. Only one country (Dominican Republic) reported a continuous supply of medicines.

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[4] An occasional stock-out is defined as a stock-out of essential medicines for chronic diseases and medicines used by DCPs for less than five days per month during the past 12 months in health facilities.

**Table 9. Stock-outs**

| Continuous supply | *Records in the information system show (at least during the past 12 months) that in the health facilities there is an uninterrupted supply of essential medicines for chronic diseases and medicines used for disease control programs.* |
| --- | --- |
| | Dominican Republic |
| **Occasional stock-outs** | *Records in the information system show (at least during the past 12 months) occasional stock-outs (less than 5 days per month) in the health facilities of essential medicines for chronic diseases and medicines used by disease control programs.* |
| | Boliva, Brazil, Colombia, El Salvador, Guatemala, Nicaragua, Peru |
| **Continuous stock-outs** | *Records in the information system show (at least during the past 12 months) continuous stock-outs (more than 10 days per month) of essential medicines for chronic diseases and medicines used by disease control programs in health facilities.* |
| | Honduras, Mexico |

- **No accurate estimation of operating costs**: The operating costs of the supply chain are not available in 6 of the 11 countries (Colombia, Dominican Republic, Honduras, Mexico, Nicaragua, and Panama). In two countries that had primary or secondary information[5] (Guatemala and Peru), the cost was categorized as "high" in accordance with international references (a cost of storage and transport higher than 20% of product value). In the three remaining countries (Bolivia, Brazil, and El Salvador), the cost was categorized as medium (between 10% and 20% of the product value). None of the countries that had information estimated their distribution costs under 10% of the product value.

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[5] Inferences derived from the study John Snow Inc. Getting products to people: the JSI framework for integrated supply chain management in public health. Arlington, VA: John Snow Inc.; 2012 Jan.

**Table 10. Cost**

| | |
|---|---|
| **Low** | *Logistics costs (storage and transport) are less than 10% of product values.* |
| | None |
| **Medium** | *Logistics costs (storage and transport) are between 10% and 20% of product values.* |
| | Bolivia, Brazil, El Salvador |
| **High** | *Logistics costs (storage and transport) are greater than 20% of product values.* |
| | Guatemala, Peru |
| **Not available** | |
| | Colombia, Dominican Republic, Honduras, Mexico, Nicaragua, Panama |

## ANALYSIS AND DISCUSSION

Diverse modalities of supply chain organization and functionality exist in the region. Their organization depends on the particular situation in each country: political, legal, and regulatory framework; geographical conditions; and sectoral reform processes, among others. Therefore, no universal or ideal *recipe* exists for improving the performance of supply chains. The countries that have begun reforms, or have proposed to do so, must, nevertheless, document the current situation, familiarize themselves with the experiences of other countries, and monitor the impact of the transformations in the availability of medicines, operational costs, and access to useful information for decision making.

To develop this study, the ASLAL has proposed a taxonomic system for the characterization of supply chains, and instruments and methodologies for the collection of data. This will allow the Alliance and other participants to monitor the changes in the systems and familiarize themselves with their implications using a standardized methodology.

The results presented in this report, for the first time, characterize the supply chains using standardized criteria. The description of the current situation (at the end of 2014) will help monitor the changes produced by the ongoing reforms and, if solid methodological tools are available in the future, establish a correlation between characteristics and efficiency.

This report, of limited circulation, is directed at technicians specialized in this field and participants responsible for transformations in medicine supply chains. Given that this methodology is still in the process of development and fine-tuning, comments and suggestions are welcome.[6]

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[6] Edgar Barillas: ebarillas@msh.org

# ANNEX 1. DATA COLLECTION INSTRUMENT

| Characteristics | Variable 1 | Variable 2 | Variable 3 | Variable 4 | | |
|---|---|---|---|---|---|---|
| **Institutional affiliation** | **Public operators** ☐ | **Private operators** ☐ | **Mixed** ☐ | **Private pharmacy** ☐ | | |
| | All or most of the supply chain operators are State institutions. | Although funding is public, all or most operators are private, contracted agents. | Public operators are responsible for some functions (storage, for example), while other private operators are responsible for others. | All of the medicines financed by private insurance are commercialized by private operators and dispensed from private pharmacies. | | |
| **Concentration of functions** | **Centralized** ☐ | **Decentralized** ☐ | **Mixed** ☐ | **Function** | **Central** | **Decentralized** |
| | | | | Programming | ☐ | ☐ |
| | | | | Purchasing | ☐ | ☐ |
| | The central level coordinates purchases, customs clearance and storage, and transport to the periphery (region or department). | Purchases, storage, and distribution to health facilities are responsibilities of the departmental/regional level. | Purchases can be centralized, but delivery to the regions/departments is direct, from where it is distributed to health facilities.<br><br>If it is mixed, complete the following box characterizing the deconcentration of functions. → | Quality control | ☐ | ☐ |
| | | | | Storage | ☐ | ☐ |
| | | | | Responsibility for transport (centers to dept./region) | ☐ | ☐ |
| | | | | Responsibility for transport to facilities | ☐ | ☐ |
| **Integration** | **Integrated** ☐ | **Vertical** ☐ | **Mixed** ☐ | **Function** | **Integrated** | **Vertical** |
| | | | | Programming | ☐ | ☐ |
| | | | | Purchasing | ☐ | ☐ |
| | Medicines and supplies for disease control programs (TB, HIV) and noncommunicable pathologies (chronic) use the same mechanisms of storage, inventory management, and transport. | Medicines and supplies for disease control programs (TB, HIV) and noncommunicable pathologies (chronic) use different mechanisms of storage, inventory management, and transport. | Some disease control programs have been integrated into a single system, whereas others keep their own warehouses, inventory management, and transport.<br><br>If it is mixed, complete the following box characterizing the integrated functions. → | Quality control | ☐ | ☐ |
| | | | | Storage | ☐ | ☐ |
| | | | | Responsibility for transport (centers to dept./region) | ☐ | ☐ |
| | | | | Responsibility for transport to facilities | ☐ | ☐ |

| Characteristics | Variable 1 | Variable 2 | Variable 3 | Variable 4 | |
|---|---|---|---|---|---|
| **Model** | **Direct delivery or purchase** ☐<br><br>The products are bought at the regional, district, municipal, or other lower levels and the products are collected by lower levels or delivered to regional, district, or municipal warehouses under the administration of the public sector. | **Primary distributor** ☐<br><br>The medicines and supplies are watched over by and distributed from one or various central or peripheral warehouses under administration of a private operator contracted by the public sector. | **Central medicine warehouse** ☐<br><br>The medicines and supplies are watched over by and distributed from one or various central warehouses, under administration of the public sector, from which transport to the periphery is coordinated. | If distribution is from a central medical warehouse, identify if the central warehouse transports in its own vehicles (**delivery**) or if the facilities come to collect (**collection**). | **Delivery** ☐<br><br>**Collection** ☐ |
| **Level of regulation** | **High** ☐<br><br>Policies, laws, and standards exist that regulate the supply of medicines. For example, price controls, facility certifications, and standardized procedures for the management of supplies exist, and they are observed. Public institutions (departments, units) are provided with the resources to carry out these functions. | **Medium** ☐<br><br>There are policies, laws, and standards that regulate the supply of medicines, but, regardless, they are not adequately observed, owing to a lack of public institutionalization. The responsible departments or units are not provided with the resources to complete these functions. | **Low** ☐<br><br>Policies may exist, but no laws and standards regulate the supply of medicines. For example, price controls or facility certifications do not exist. Public institutionalization for regulation of medicine supply does not exist, nor is it required. | | |

| Characteristics | Variable 1 | Variable 2 | Variable 3 | Variable 4 |
|---|---|---|---|---|
| **Information system** | **High accuracy and timeliness** ☐ An information system (public or private) offers timely and accurate information to decision makers, at least in regard to consumption and stock availability at the health facility level and, by aggregation, at the national level. | **Low accuracy and timeliness** ☐ A designed and implemented information system exists (public or private), but the information is not useful for decision making because of its lack of timeliness and accuracy. The most accurate information that can be used is from the departmental or central warehouses. | **Nonexistent** ☐ No information system (public or private) offers timely and accurate information to decision makers, at least in regard to consumption and stock availability at the health facility level and, by aggregation, at the national level. | |
| **Availability of medicines** | **Continuous supply** ☐ Records in the information system show (at least during the past 12 months) that in the health facilities there is an uninterrupted supply of essential medicines for chronic diseases and medicines used for disease control programs. | **Occasional stock-outs** ☐ Records in the information system show (at least during the past 12 months) that in the health facilities there are occasional stock-outs (less than five days per month) of essential medicines for chronic diseases and medicines used by disease control programs. | **Continuous stock-outs** ☐ Records in the information system show (at least during the past 12 months) that in the health facilities there are continuous stock-outs (more than 10 days per month) of essential medicines for chronic diseases and medicines used by disease control programs. | |

| Characteristics | Variable 1 | Variable 2 | Variable 3 | Variable 4 |
|---|---|---|---|---|
| **Cost** | **Low**<br>☐<br>The logistics costs (storage and transport) are less than 10% of product values.<br><br>Source: | **Medium**<br>☐<br>The logistics costs (storage and transport) are between 10% and 20% of product values.<br><br>Source: | **High**<br>☐<br>The logistics costs (storage and transport) are more than 20% of product values.<br><br>Source: | **Not available**<br>☐<br>No logistics operational cost estimates exist. |

**Comments:**