



USAID
FROM THE AMERICAN PEOPLE

USAID GLOBAL HEALTH SUPPLY CHAIN PROGRAM
Procurement and Supply Management

GS1 Global Location Number (GLN)

Opportunities and Challenges to Leveraging the GLN as an Identifier in the Global Health Supply Chain Context

SEPTEMBER 2023



USAID
FROM THE AMERICAN PEOPLE



PEPFAR
U.S. President's Emergency Plan for AIDS Relief

PMI

**U.S. PRESIDENT'S
MALARIA INITIATIVE**

LED BY



The USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM) project is funded under USAID Contract No. AID-OAA-I-15-0004. GHSC-PSM connects technical solutions and proven commercial processes to promote efficient and cost-effective health supply chains worldwide. Our goal is to ensure uninterrupted supplies of health commodities to save lives and create a healthier future for all. The project purchases and delivers health commodities, offers comprehensive technical assistance to strengthen national supply chain systems, and provides global supply chain leadership.

GHSC-PSM is implemented by Chemonics International, in collaboration with Arbola Inc., Axios International Inc., IDA Foundation, IBM, IntraHealth International, Kuehne + Nagel Inc., McKinsey & Company, Panagora Group, Population Services International, SGS Nederland B.V., and University Research Co., LLC. To learn more, visit ghsupplychain.org.

DISCLAIMER:

The views expressed in this publication do not necessarily reflect the views of the U.S. Agency for International Development or the U.S. government.

Contents

- Acronyms 2**
- Introduction 3**
- GLN Standard Overview 4**
 - The GLN Standard in Health Care 4
 - Process and Tools for GLN Allocation, Management, and Data Sharing 5
 - GLN Allocation 5
 - GLN Master Data Maintenance 5
 - GLN Master Data Sharing 6
- Near-Term GLN Use Cases and Opportunities for Global Health 7**
 - Use Cases 7
 - Why Now? 8
 - Regulatory Trends 8
 - An Emerging Global Sharing Model 8
 - Scaling and Sustainability 9
- Implementation Considerations 10**
 - Use Must Drive Allocation 10
 - Responsibility 10
 - Cost Structures 11
 - Defining Global Locations 12
- Recommendations 13**
 - Use-Driven Adoption 13
 - Sustainable Financing 13
 - Engage GS1 MOs to Identify Mutually Beneficial Opportunities 14
 - Alignment with Global Investments in Digital Management of Master Data 14
 - Global Registry Integration 14
- Conclusion 15**

Acronyms

| | |
|-------|--|
| AIDC | automatic identification and data capture |
| ASN | advanced ship notice |
| B2B | business-to-business (as in e-commerce) |
| CMS | central medical store |
| EDI | electronic data interchange |
| EPCIS | Electronic Product Code Information Services |
| GDSN | GS1 Global Data Synchronization Network™ |
| GEPIR | GS1 Global Electronic Party Information Registry |
| GLN | Global Location Number |
| GTIN | Global Trade Item Number |
| IPA | international procurement agent |
| MDM | master data management |
| MO | GS1 member organization |
| MFL | master facility list |
| MOH | Ministry of Health |
| NDRA | national drug regulatory authority |
| NGO | non-governmental organization |
| PO | purchase order |
| RDC | regional distribution center |
| SDP | service delivery point |
| TRVST | UNICEF Traceability and Verification System |
| VTI | Verification and Traceability Initiative |

Introduction

Global standards provide the foundation for business communications, facilitating the provision of services, movement of products, and information about them across trading partners and borders. Over the past two decades, drug regulatory authorities and the health care industry have been aligning on the adoption of global standards – namely GS1 as the leader in healthcare supply chain standards –to facilitate the identification, data capture, and data sharing required to enable pharmaceutical traceability. Nevertheless, the majority of implementations that have been scaled to date are national (or, in the case of the European Union, regional) in nature. These closed ecosystems have enabled organizations to identify locations and entities with proprietary standards leveraging centralized identification assignment and master data management approaches.

Conversely, the decentralized and sprawling global health ecosystem, consisting of pharmaceutical manufacturers, bilateral and multilateral donors, government entities (e.g., ministries of health [MOHs], national drug regulatory authorities [NDRAs]), nongovernmental organizations (NGOs), and public- and private-sector service providers operating at global, regional, and national scales creates additional complexity in implementing traceability and end-to-end data visibility initiatives. GS1 global standards are critical enablers in these pursuits. However, there are challenges in the widespread adoption of the Global Location Number (GLN) to uniquely identify locations across the hundreds of thousands of entities collaborating through the global health ecosystem.

This paper explores GLN use cases in the global health context, assesses the challenges and opportunities for implementation, and provides recommendations for ecosystem partners in pursuit of standardized locations supported by robust master data management.

GLN Standard Overview

The GLN Standard in Health Care

In the system of GS1 standards, the GLN – a 13-digit number – serves as the unique identifier for legal entities, functions, physical locations, and digital locations in a manner that is simple, unique, multi-sectoral, and global.¹

Figure 1. Composition of a GLN



The GLN enables the unique and unambiguous identification of any type of location used in business processes, which is a prerequisite for efficient communication between trading partners. A GLN acts as a database key, which references location-specific information that is repeatedly applied. Its function is to reduce input errors and increase efficiency.

GS1 Healthcare GLN Implementation Guideline

In health care, the GLN can be used in e-commerce and supply chain functions from planning to procurement, logistics, and the point of service delivery. GLNs can be used in the supply chain to identify trading partners and key physical locations but also within a health care service delivery context in identifying facilities, units, and other entities that manage health care supplies and/or dispensing medicines to patients.

The implementation of GLNs – for sold-from, manufacture-from, ship-from, and data synchronization locations and/or legal entities – is a foundational element in managing data exchange leveraging the GS1 share standards, including the GS1 Global Data Synchronization Network (GDSN) for master data, electronic data interchange (EDI) for transaction data, and Electronic Product Code Information Services (EPCIS) for event data. The use of the GLN enables unique identification of a single party or location in the supply chain in a simple, standardized electronic format, without having to exchange descriptive data (e.g., entity name, postal address, etc.) in varying formats with each and every transaction. Table 1 describes how the GLN is leveraged within different GS1 share standards.

Table 1. Example of where GLNs are leveraged using GS1 “share” standards

| GS1 Share Standard | Example uses of GLN |
|--------------------|---|
| GDSN | <ul style="list-style-type: none"> • A requirement to register for the GLN to identify a party for synchronization • A mandatory attribute to identify the Brand Owner of the GTIN master data being shared via the GDSN, as well as an optional attribute for other characteristics such as manufacturing location |
| EDI | <ul style="list-style-type: none"> • On the purchase order (PO) and invoice to uniquely identify the purchasing party and the purchased-from party • On the advanced ship notice (ASN) to uniquely identify the ship-from and the ship-to party |
| EPCIS | <ul style="list-style-type: none"> • On an EPCIS message to uniquely identify the initiating party of the event and the intended receiving party of an event (if applicable) |

¹ For more information about the use of GLN in healthcare, please visit: <https://www.gs1.org/standards/healthcare-gln-implementation-guideline/current-standard#1-Introduction>

Process and Tools for GLN Allocation, Management, and Data Sharing

GLN Allocation

When an organization decides to leverage GS1 standards in its supply chain business processes, it must first register with a GS1 Member Organization (MO), and then it is assigned a GS1 company prefix.² The GS1 MO requires that an application be completed with key company information and that a business certificate is provided to validate the entity. This GS1 company prefix is the basis for subsequent GLNs and GTINs assigned by that organization.

As federated entities, different GS1 MOs have different business models and pricing structures they offer to organizations seeking to register with GS1. While organizations often will register with their local or regional GS1 MO, they are not bound to register with a specific GS1 MO; they can survey the market of GS1 MOs to determine what model best suits their business needs and use cases. Thus, an entity in Ghana could choose to register their GS1 company prefix with GS1 Ghana, or they may choose to register with GS1 Nigeria or GS1 South Africa, depending on the services required by their organization and offered by the MO based on the market(s) they seek to support. For example, some GS1 MOs offer a service that assigns one-off GLNs to an organization seeking to identify one or more locations or parties within their purview, while other GS1 MOs require organizations to purchase blocks of GLNs.

GLN Master Data Maintenance

Alone, the GLN is simply a unique number. The full context of a GLN comes from the master data found in reference databases, which are critical to all use cases in the supply chain.

Master data is the core information about the "who" and "what" in a trading relationship. The "who" can include the name, address and identification codes of the buyer and seller plus details of shipping, delivery and billing locations. The "what" is product information such as product name, description, size and barcode number.³

That data must be trusted to enable accuracy, efficiency, and security through its use in supply chain transactions or traceability events.

At the global level, GLN data owners need to maintain a minimal set of attributes in their GS1 MO registry platform, and those attributes should be accessible via MO-specific tooling; for example, GS1 Data Hub® | Location from GS1 US or Onesource from GS1 Nigeria.⁴ GLN master data attributes include qualities like contact information, postal address, geo-coordinates, entity type, and more depending on the use case and descriptive information required.⁵

In 2021, a new GS1 GLN Data Model Solution Standard⁶ was released to establish a set of global attributes (mandatory and non-mandatory) to comprehensively identify GLNs and their attributes, and

² For a complete list of GS1 MOs, please visit: <https://www.gs1.org/contact/overview>

³ For more information about master data and applicable GS1 standards, please visit: <https://www.gs1ie.org/standards/data-exchange/master-data/>

⁴ For more information on the GS1 US Data Hub | Location, please visit: <https://www.gs1us.org/tools/gs1-us-data-hub/location>

⁵ For more information on GLN data model attributes, please visit: <https://www.gs1.org/standards/gln-data-model-solution-standard/current-standard#5-GLN-data-model-attributes>

⁶ For more information on the most recent GLN Data Model Solution Standard, please visit: <https://www.gs1.org/standards/gln-data-model-solution-standard/current-standard>

to support the deployment of future GLN solutions and services. As this data model is relatively new, GS1 MOs are in the process of adopting this data model for the GLN registries available to their members. Outside of these registries, trading partners, regulators, and other stakeholders who control or have an interest in those locations or entities within the global health ecosystem may also maintain their own databases with GLNs and descriptive attribute information or other relevant identifiers (e.g., other internal location identifiers).

Regardless of tooling, the organizations that own GLNs are responsible for ensuring the associated master data is current and accurate, requiring an organization to have consistent processes and governance structures to maintain and verify data on a routine basis. This becomes more challenging the more decentralized the GLN assignment and management process becomes, and the more limited the scope of an organization's engagement with GS1. For example, if an organization is managing dozens of GLNs and hundreds or thousands of GTINs, a stronger case can be made for having dedicated resources to ensure master data is maintained accurately for sharing on global registries. Limited deployments that do not prioritize the case for standards increase the risk of lax master data management.

GLN Master Data Sharing

To facilitate communication between entities, those trading partners or other interested parties need to know the GLN and the master data associated with it. Currently, that information is hosted and maintained in GS1 MO GLN registries and is accessible via GS1 MO-specific tooling and, to a limited extent, within GS1's Global Electronic Party Information Registry (GEPIR).⁷

GS1 is currently standing up the GS1 Global Registry for a limited number of GS1 MOs to promote sharing across regions and GS1 MOs. With greater interoperability, GLN master data will be made accessible to more entities in the supply chain. However, the emerging GS1 Global Registry still has its limitations – it does not adopt a subscribe-and-synchronize model like the GDSN, so the ability to query and source GLNs and associated master data will still primarily be a pull model by registered stakeholders. This data can be accessed through GS1 MO-specific tools.

⁷ For more information on GLN-related data through GEPIR, please visit: <https://gepir.gs1.org/>

Near-Term GLN Use Cases and Opportunities for Global Health

Use Cases

There are numerous use cases for globally unique identifiers within the global health community, driven by widespread demand for standard, unique identifiers to associate with trade item custody or ownership as it moves through the supply chain from manufacturer to end user. These use cases are generally around transaction and event data management at the global and national level.

At the global level, the primary users are international procurement agents and members of the Verification and Traceability Initiative (VTI), who seek to manage and share traceability data as trade items move through the global supply chain and various regional distribution centers (RDCs) prior to being distributed to various country programs.⁸ Currently, this is being done through the UNICEF Traceability and Verification System (TRVST) for COVID-19 vaccines, but an expansion of this platform or deployment of other global traceability platforms will drive scale for traceability data sharing in the future.

At the national level, standardized identification of trade items and locations helps maintain the digital thread, both in business-to-business (B2B) transactions across public and private sector stakeholders and in national traceability systems. In all these use cases, strong master data management (MDM) for trade items and locations by all trading partners serves as an essential building block to enable accurate transactional and event data exchange throughout the supply chain. Table 2 introduces a representative example of health use cases for GLN-based location identification at the global and national levels; it is intended to be representative, but not exhaustive of all potential applications of GLNs in supply chain and health care contexts.

Table 2. Representative Global Health Use Cases for the GLN

| Scope | Actors | Representative Use Case |
|---------------|---|---|
| Global | | |
| Transactions | International procurement agents (IPAs) | IPAs require unique identifiers and accurate master data for pick-up and ship-to locations to accurately execute and have visibility into end-to-end supply chain processes. As IPAs implement electronic transaction data exchange mechanisms (e.g., EDI), the ability to leverage a GLN as the unique identifier across trading partners creates efficiency in the process. |
| Events | VTI | As global traceability systems designed around the GS1 EPCIS standard advance, GLNs will become increasingly important for global traceability in the chain of custody—for manufacturers, wholesalers, intermediary locations (e.g., IPA RDCs), ship-to locations, and verification sites. |
| Master | IPAs and suppliers | IPAs and suppliers need the ability to share master data on in-scope locations (e.g., pick-up, ship-to). Standardized identification and sharing of master data enables accurate logistics operations. |

⁸ For more information on the VTI, please see: <https://www.digitalhealthcoe.org/knowledgebase/verification-%26-traceability-initiative->

| Scope | Actors | Representative Use Case |
|-----------------|---|--|
| National | | |
| Transactions | Distributors | Public and private sector distributors, whether they be medical stores, wholesalers, or other entities, require unique identifiers and accurate master data for ship-from and ship-to locations and entities. This master data is essential to accurately manage receipt of commodities, including donations intended for specific channels, and to execute purchase orders. As distributors implement automation in their operations, including automatic identification and data capture (AIDC) or EDI, standardization will drive data quality and efficiency in processes for managing commodities and supporting data exchange. |
| Events | NDRAs and MOHs | As regulations are passed and national traceability repositories are deployed in an increasing number of countries, the drive towards standardized data exchange (e.g., EPCIS) is anticipated to emerge as stakeholders seek to minimize market-specific reporting requirements. This will necessitate the use of GLN for global entities, with consideration for standards for unique identification at service delivery points, whether global or national. |
| Master | MOHs, distributors, health facilities, etc. | Master facility lists (MFLs) are established nationally and vary by country on how health facilities are uniquely identified. MOHs are often the responsible party for maintaining MFLs and act as the central authority for distributing up-to-date data. Adoption of GLNs in-country can help to transform MFL data into a standardized set of location data that can be leveraged for both national and global use cases. |

Why Now?

Current regulatory trends and GS1 MO investments are creating a unique inflection point for increased GLN implementation and use across the supply chain.

Regulatory Trends

As momentum grows around implementation of national pharmaceutical traceability in a number of countries—including Ethiopia, Nigeria, Rwanda, and Zambia—there are implementations in which GLNs have been or are expected to be allocated to facilities such as manufacturing sites, warehouses, and service delivery points. This creates an opportunity to leverage these GLNs for other global use cases at no additional monetary or management overhead cost for GLN allocation and master data management.

An Emerging Global Sharing Model

As a part of the GS1 modernization initiative that includes the updated GLN data model and GS1 Global Registry, new and improved tools for data management and data sharing are actively in development or have recently become available. Not only does this create opportunities to leverage these tools for improved master data management and master data sharing between supply chain partners, but also to influence these tools to meet the specific needs of global health. Data management and sharing tools

also ensure that, regardless of the market or GS1 MO that a manufacturer, trading partner, or in-country partner works in, they will be able to describe and share location data in a standardized way.

Scaling and Sustainability

As momentum grows toward adoption of GS1 standards for health care generally, and specifically in sub-Saharan Africa, the membership within regional GS1 MOs is expected to continue to grow in the health care sector. This growing membership brings several advantages around costs and pricing. First, trading partners that have a GS1 company prefix for other supply chain functions such as GTIN allocation can also use that prefix to allocate GLNs at no additional cost. Second, a growing membership means a growing revenue pool, enabling GS1 MOs to potentially offer services like GLN allocation and training services at a sustainably lower cost.

Additionally, this growing scale allows all partners in the supply chain to leverage successes, lessons learned, and resources across multiple markets or parts of the supply chain. Sustainably scaled adoption of GS1 standards can help create an environment in-country where GS1—or specifically, GS1 GLN—champions will exist that advocate for furthering political commitments to standards and coordinating governmental stakeholder buy-in. There can be a positive feedback loop of scaling, increased ease of adoption, and continued scaling.

Implementation Considerations

The following considerations comprise challenges and related mitigations for GLN allocation, master data management, and use in the global health community, including both supply chain and service delivery functions.

Use Must Drive Allocation

The allocation of unique identifiers is foundational and fundamental for the use of those identifiers in supply chain functions, so it is common for the plans for allocation and management to move forward before the systems that will use them are implemented. However, this course of action carries risks; as alluded to in Figure 2, if GLN allocation predates GLN use in a supply chain by a significant period of time, then the natural incentives to maintain accurate master data for the purpose of enabling those supply chain functions are diminished, which then decreases the attention to maintaining or improving data quality, which weakens data quality and trust, which further disincentivizes use.

Therefore, it is imperative that GLN allocation be followed very quickly by use of GLNs in transactions and master data management in existing supply chain functions, such as facility registries and logistics systems. This applies to both global and national use cases for transaction, event, and master data sharing.

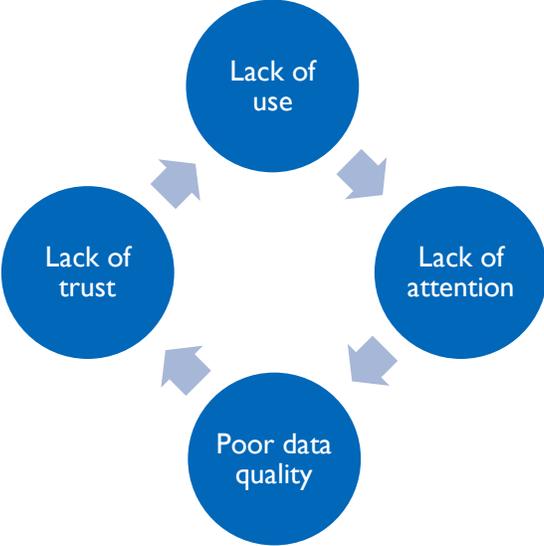


Figure 2. Contributors to the risk of a “negative feedback loop”

Responsibility

The primary challenge to GLN allocation and management—or, indeed, to location and entity master data management as a whole—is determining which organization and which individuals within an organization are accountable for creating, maintaining, and governing accurate location master data.

Within national use cases for transaction, event, and master data sharing, we must draw a distinction between the centralized and decentralized parts of the health system. In a centralized strategy, one group is responsible for selecting, commissioning, updating, and decommissioning locations, for example, medical stores or public facilities owned and managed by the MOH. The organization responsible for these locations should also be responsible for allocating and maintaining GLNs and their accompanying master data. In a decentralized strategy, such as within the private or nongovernmental sector, many organizations may be responsible for one or a few locations or group of locations for which information may need to be stored and shared to describe transactions or events in the supply chain. In the latter case, data should be maintained by whichever entity is responsible for the location, which may be within the location itself or may be an entity responsible for a group of locations. Implementation of many use cases will require coexistence of centralized and decentralized GLN allocation strategies based on the set of stakeholders in scope.

Within global use cases, the question of responsibility is made more complex by the fact that global organizations typically work with external governmental and nongovernmental partners and do not themselves have ownership, responsibility, or control over most locations in the health care supply chain. In this case, while global actors may be the catalyst for GLN allocation, it is imperative that those global actors work closely with local actors to maintain agency over location data, including ensuring that local actors have direct access to registry tools and are held accountable for the provision and maintenance of accurate information. Similar to national use cases, we must consider different ownership models for centralized and decentralized parts of the health ecosystem.

For all use cases, responsibility must be supported by a clear understanding of the incentives for data provision and maintenance, clear standard operating procedures, a need for harmonized buy-in across local and global stakeholder groups, safeguards to maintain information and tooling across staff turnover, tool maintenance, and prioritization of data management from leadership. It is imperative to ensure that accountability for data management is aligned with incentives. If the organization benefiting from the GLN and the accompanying master data is separate from the organization responsible for managing that data, then there is a much weaker incentive for that data to be maintained.

Cost Structures

The cost to license GLNs is highly variable. Fee structures can differ for GLN allocation and management services depending on the GS1 MO. Most commonly, these fee structures consist of either a one-time fee for the issuance of the GLN (common in the one-off GLN assignment model) or a subscription-based fee structure that requires an upfront payment and an annual subscription fee to maintain the GLN over time (common in the block purchasing GLN assignment model).

One-off GLN assignment is used when a singular location or business entity purchases a GLN through the GS1 MO. While there are no constraints on the volume of one-off GLNs purchased, the one-off model is typically used by organizations that do not need to identify more than a few entities. The one-off GLN assignment model is often associated with a one-time fee per individual registration.

The subscription-based fee structure is introduced when an organization is looking to block purchase GLNs to assign across myriad different business locations and entities. The block purchasing GLN model provides an organization with the opportunity to purchase up to dozens, hundreds, or even thousands of GLNs under the purchasing organization's GS1 company prefix for all current and future locations that require identification. Typically, GLN block purchasing requires an upfront fee as well as an ongoing renewal fee that is determined by the size of the block of GLNs reserved. Typically, this model is less expensive per GLN than the one-off purchasing model but has ongoing costs.

A GS1 MO may offer different pricing models at their discretion, so national or global entities seeking to engage a GS1 MO to license a GLN or begin a program requiring local GLN allocation may encounter different models based on the GS1 MO they engage with. Further inquiry and discussion with GS1 MOs based on organization-specific needs is encouraged where GS1 MO has an appetite to engage and consider adjusted models based on user community need.

Regardless of structure, at the scale of an entire health system, the cost can be significant and likely to be ongoing. Potential mitigations for this are discussed in the Recommendations section.

Defining Global Locations

Once an organization is ready to define a GLN or set of GLNs, the GLN must be linked to a unique location. Defining a location may initially seem simple, but can be deceptively complex. While the GLN Allocation Rules Standard⁹ addresses some unique needs in the supply chain such as digital locations, it was not designed with the unique needs of global health in mind, and so rules and their accompanying tooling may require additional consideration when locations are defined. For example, systems must be able to accommodate locations that do not have a standard address as understood by the current GLN data model (e.g., across from the ShopRite on Kenyatta Avenue). As global standards are developed by existing industry working groups, they may reflect a status quo that does not translate to local needs.

In addition to refining locations, models for validation of address and location information tend to assume that the GLN owner, if not the location itself, is based in the same market as the GS1 MO. As many countries, particularly in sub-Saharan Africa, do not have GS1 MOs, they are reliant on other GS1 MOs in the region that may not be familiar with local context and may not be able to validate or organize key location information (e.g., postal codes, municipality hierarchies) in the correct manner. The differences in local market resources and infrastructure shape the confines in which location (e.g., address) information can be documented. These differences generate a need for flexibility in GLN allocation, which likely does not currently exist because current GLN usage and tooling has been designed with largely different end-customers in mind. It is possible that GLN tooling and standards need updating to reflect the global health market dynamics discussed above.

To mitigate location variations and inconsistencies, it is important to assess whether GS1 MO tools can accommodate locally appropriate information (or can be adjusted to become so) prior to selecting a GS1 MO. Similarly, it is key that GS1 MOs—which take on the responsibility of servicing neighboring countries—establish policies and processes for keeping and sharing out-of-country information or GLNs allocated by other GS1 MOs in order to accommodate the needs of multinational organizations or organizations without a local GS1 MO.

⁹ For more information on the rules around GLN allocation, please visit: <https://www.gs1.org/standards/gln-assignment-rules-standard/current-standard>

Recommendations

Use-Driven Adoption

When considering any cost-benefit analysis, it is important to center the specific use case under consideration. In the case of GLN allocation, use cases focused on the supply chain should not be conflated with those focused on the health care system, as the organizations deriving value are largely different. In practice, this means that implementation should be considered separately for supply chain partners or nodes from service delivery points due to different considerations, cost-benefit analysis, and, in particular, ownership.

In developing a shared vision for GLN adoption, organizations should consider the role GLN master data will play within the overall country health system and health system digital strategy. Having a GS1 standards champion within an organization or governmental agency will catalyze adoption of GLN assignment, maintenance, and data sharing; the champion should be situated within existing master data management or facility management activities wherever possible.

In September 2019, the Nigeria National Agency for Food and Drug Administration and Control (NAFDAC) launched a 5-year strategy to implement traceability of pharmaceutical products. The onset of COVID-19 fast-tracked a powerful proof of concept, starting with the verification of COVID-19 vaccines being dispensed in the public sector. With this limited scope in mind, NAFDAC worked with GS1 Nigeria to first prioritize assigning GLNs to the several hundred supply chain locations specifically managing vaccine distribution, from ports of entry to warehouses, to ensure identification of the responsible parties in the verification process in concert with the unique identification of product itself, with the intention to scale adoption as the implementation strategy is further deployed over subsequent years.¹⁰

GS1 Healthcare Reference Book 2022-2023

Sustainable Financing

Given the cost associated with GLN allocation, particularly at scale, sustainable funding mechanisms must be considered as a fundamental constraint to the speed and scale of GLN adoption from the onset. Different funding mechanisms may be suitable for different use cases, with factors concerning how GLN adoption is financed including:

- From where is the demand for GLNs being driven? Who will benefit most from their adoption?
- Are use cases being driven from the supply chain or the health care delivery system? How many unique organizations are impacted, and how many locations do they have in scope?
- Of the in-scope actors, what proportion are private sector and what proportion are public sector? What resources do they have available to independently finance implementation?
- Do GLNs need to be adopted in bulk to meet the use case, or can they be adopted and used incrementally as the program scales?
- Based on the use cases, are one-off or block GLN allocations being considered? Are there options for one-time fees or is a recurring subscription required?

Depending on the answers to these questions, different sources of financing may be considered as described in Table 3 below.

¹⁰ Nigeria's experience in tracking the distribution of COVID-19 vaccines, including the use of GLNs, can be found in the GS1 Healthcare Reference Book 2022-2023, available here: https://www.gs1.org/system/files/gs1seg220630_01_reference_book_2022-2023_nigeria.pdf

Table 3. Potential Sources of Financing for GLN Allocation

| Source | Description |
|------------------|---|
| Private | Private funding from the entities being asked or required to adopt a GLN. This type of funding source may be more viable for supply chain use cases or large private hospital or pharmacy networks with for-profit business models. |
| Government | Public funding from governments for nationally mandated use cases driven by regulation or policy. This type of funding source may be more viable for health care delivery use cases, such as MFLs, and where use cases have government-owned entities in scope, such as public sector warehouses and service delivery points. |
| In-Kind Donation | An in-kind donation from a public or private donor or an implementing partner to support GLN adoption for a subset of entities or en masse for national implementation. This type of funding source may be more viable for use cases that address a specific need or pain point identified by that stakeholder, and where the use of GLNs have a clear value proposition as part of an accelerator for broader health system strengthening initiatives. |

Engage GS1 MOs to Identify Mutually Beneficial Opportunities

Given the scale and significance of the potential use of GLNs for global health, GS1 MOs have a vested interest in the use of GS1 standards for location identification. Because of this, GS1 MOs should be engaged as a partner from the beginning of any GLN initiative, as they can offer services such as development of customized allocation tooling, educational approaches, and adapted pricing models. It may also be possible to negotiate standard pricing models for health care depending on the scope and scale of implementation and the potential mutual benefits that can be realized between governments and GS1 MOs in terms of expanded membership over time.

Align with Global Investments in Digital Management of Master Data

There are a number of ongoing investments in digital health for global health, particularly in the management of master data, such as investments in national product catalogs, WHO MDM initiatives, and—adopted by over 60 countries—an OpenHIE health enterprise architecture comprising Client Registry, Facility Registry, Health Worker Registry, and Shared Health Record. GLN allocation and use should be considered as one of the core standards incorporated into these initiatives to support system-wide interoperability of what otherwise are disparate systems, and to enable a network effect to scale these initiatives. It is recommended that there be regular engagement and advocacy for the use of GLNs on initiatives such as OpenHIE, WHO Product Master, and other programs.

Global Registry Integration

Use of GLNs requires access to up-to-date, well-maintained master data describing locations. The upcoming GS1 Global Location Registry is a start to achieve this—functioning as a repository of GLN information that can be queried through direct party name searching. GLN information is displayed in real time and is external-facing, open to all global registry users. However, to ensure that systems stay up to date, it is imperative that functionality be developed to push or regularly query updates for systems using GLNs through direct integration. The global health community expects that all member organizations offering access to the location data registry offer APIs or other integrations constructed with this need in mind.

Conclusion

There is significant momentum across the global health community in driving the implementation of GS1 global standards for health care, seeking benefits in advancing end-to-end data visibility, improving supply chain security, gaining supply chain efficiencies, and ensuring patient safety. Leveraging GLN as a standard for identification of locations and entities is an important piece of this puzzle, particularly as advancements are made in electronic transaction and event data exchange. However, implementation can be complex and costly, and it must be done with a focus on data quality, master data management, and data access to realize the anticipated benefits. GLN adoption is not something that can be planned in silos, but rather requires coordination and intentional consideration. With the appropriately tailored vision and strategy, system architecture and policy frameworks, and standards champions in place, GLN adoption can greatly strengthen data quality and communication within the global health ecosystem.