



USAID GLOBAL HEALTH SUPPLY CHAIN PROGRAM
Procurement and Supply Management

Assessment of the Availability of Quality Newborn and Child Health Commodities in Mali

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.

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Acronyms

CRGS	Compte Rendue de Gestion de Stock
CTCSGME	Comité Technique de Coordination et de Suivi de la Gestion des Médicaments Essentiels
DGSHP	Direction Générale de la Santé et d'Hygiène Publique
DPM	Direction de la Pharmacie et du Médicament
DT	dispersible tablets
GHSC-PSM	USAID Global Health Supply Chain Program-Procurement and Supply Management project
ICRC	International Committee for the Red Cross
LMIS	logistics management information system
MOH	Ministry of Health
NBCH	newborn and child health
OSPSANTE	Outil de Suivi des Produits de Santé
PPM	Pharmacie Populaire de Mali
SDG	UN Sustainable Development Goal
TdH	Terre des Hommes
UNCoLSC	UN Commission on Life-Saving Commodities
UNFPA	UN Population Fund
UNICEF	UN Children's Fund
USAID	U.S. Agency for International Development

Background

Infectious diseases such as diarrhea and pneumonia, and other early-life complications such as birth asphyxia, contribute significantly to child morbidity and mortality despite the existence of effective medicines and equipment for prevention and treatment. While overall child mortality has decreased in recent decades, child mortality and morbidity, especially in the first year of life, remain high. The UN Children's Fund (UNICEF) estimates¹ that **in 2018 there were an estimated 4 million infant deaths** worldwide.

Mali's mortality rate for children under the age of five has consistently decreased since 2004, but not rapidly enough to meet the [2030 Sustainable Development Goal \(SDG\) for child mortality](#). The country currently ranks 184th globally in this category, with an estimated² 97.8 deaths per 1,000 live births for under-five children and 32.7 neonatal deaths per 1,000 live births in 2018. This lag is partially due to the limited availability of essential newborn and child health (NBCH) commodities in Mali's national health supply chain.

Essential to improving NBCH outcomes and meeting the SDGs is ensuring that skilled providers receive the medicines and equipment they need. In 2010, a global call to action for national governments established the [UN Commission on Life-Saving Commodities for Women and Children](#) (UNCoLSC). Tasked with reducing child mortality and improving maternal health, the commission identified 13 commodities that could save the lives of more than 6 million women and children if more widely accessed and properly used. Among them were amoxicillin, used to treat pneumonia and possible serious bacterial infection (PSBI) in children under five; oral rehydration salts (ORS) and zinc, used to care for children with diarrhea; and newborn resuscitation equipment to respond to birth asphyxia.

WHO has called on health ministries and their partners to increase access to the essential NBCH commodities by increasing their availability via the national supply chain, by ensuring their proper use, and by backing easy-to-administer formulations. The formulations recommended as most likely to increase uptake in low-resource settings are amoxicillin dispersible tablets, co-packaged ORS and zinc, and appropriate newborn resuscitation equipment.

Unique benefits of essential NBCH commodities

Amoxicillin dispersible tablets (amoxicillin DT) are more stable, less costly, and easier to manage in the supply chain than the historically used oral suspension (syrup) formulations. The dispersible tablet has less volume and weight than the syrup and does not require refrigeration. Dosing of dispersible tablets is more simplified than other formulations for those administering it and tends to be more accurate, according to UNICEF³.

Saving children's lives depends on global access to the essential commodities identified by UNCoLSC in 2012.

Each year an estimated 1.36 million children die due to pneumonia alone; it is the leading cause of death among infants and children.

Diarrhea kills approximately 760,000 children annually and is the second leading cause of death for this group despite it being highly treatable.

Birth asphyxia kills 814,000 newborns every year.

Source: UN Commission on Life-Saving Commodities for Women and Children (2012). Commissioner's Report.

¹ WHO, 2019: http://www9.who.int/gho/child_health/mortality/neonatal_infant/en/.

² WHO, 2019: <https://apps.who.int/gho/data/node.cco.ki-MLI?lang=en>

³ UNICEF, 2018, Amoxicillin Dispersible Tablets: Market and Supply Update: www.unicef.org/supply/media/511/file/amoxicillin-dispersible-tablets-market-and-supply-update.pdf.

Countries that increase the availability of **co-packaged ORS and zinc** (ORS+zinc) can improve NBCH outcomes in many ways. Treating diarrhea with this commodity combination reduces severity and recurrence of episodes. It's estimated that more than 75 percent of deaths caused by diarrhea can be averted by the use of ORS and zinc together. However, this co-packaged formulation hasn't made it to the point of care in many countries. In 2017⁴, 42 percent of patients with diarrhea globally were treated with ORS only and 7 percent with ORS+zinc. One study found that when co-packaged and supplemented with instructional messages, adherence to an ORS+zinc diarrhea treatment regimen increased—by as much as 15 percent in Ethiopia⁵.

Newborn resuscitation equipment (referring to the self-inflating resuscitation bag and appropriate facemask size for term and preterm infants), when paired with training on use and reprocessing, helps to establish adequate breathing and circulation for newborns when complications arise at birth or during the neonatal period. However, the equipment may not be available or facility staff may not have the capacity to use it. Low-cost and easy-to-use resuscitation equipment is available from many suppliers globally. WHO recommends⁶ using a resuscitation equipment package that includes the following:

- Self-inflating resuscitation bag
- Neonatal face masks (size 0 and size 1)
- Electric or foot-operated suction pump and bottle
- Single-use suction catheter
- Single-use or multi-use suction bulb that can be opened, cleaned, and sterilized
- Infant stethoscope

Rapid study on availability of essential NBCH commodities in Mali

USAID and others continue to invest in programs to reduce child mortality. However, access to essential NBCH commodities remains limited in many countries. Mali has been the focus of donor activities to improve newborn and child health in recent years due to its limited progress toward the SDGs. In 2019, the USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM) project conducted a rapid study in Mali to identify supply chain barriers to essential NBCH commodity availability. The study also identified potential solutions to increase commodity availability in Mali's national public health system. This report shares findings and considerations from the study.

⁴ Countdown 2017 Report: <https://www.countdown2030.org/reports-and-publications/countdown-2017-report>

⁵ <https://www.ncbi.nlm.nih.gov/pubmed/27246705>

⁶ <https://apps.who.int/medicinedocs/documents/s22389en/s22389en.pdf>

Methodology

The GHSC-PSM rapid study in Mali began by analyzing national health supply chain operations, both across health areas and specifically for the essential NBCH commodities—amoxicillin DT, ORS+zinc, and newborn resuscitation equipment. During the initial desk review, the study mapped data collection and commodity supply processes managed via the supply chain. To understand country treatment preferences for diarrhea, pneumonia and birth asphyxia, the study team reviewed clinical documents and national standard treatment guidelines. The team also analyzed commodity availability and consumption data and identified NBCH and supply chain partners.

A field study phase was then conducted, interviewing designated supply chain and NBCH partners. These stakeholders were asked to describe (1) upstream and downstream factors that impact commodity availability and (2) opportunities to improve access to essential NBCH commodities. The interview guide addressed four realms that typically affect supply chain efficiency and drive stock availability, including:

- **Enabling environment:** includes national policies, health programs, and financing
- **Forecasting, supply planning and procurement:** includes quantification approaches, data collection, and sourcing processes
- **Inventory management:** includes warehousing and distribution
- **Logistics and use:** includes ordering, reporting, data management, and facility management

A total of 19 meetings were conducted, including eight meetings with Malian Ministry of Health (MOH) agencies. Among these agencies, Direction Générale de la Santé et d'Hygiène Publique (DGSHP) oversees health services provision, Direction de la Pharmacie et du Médicament (DPM) governs medical supplies, and Pharmacie Populaire de Mali (PPM) provides procurement, warehousing and distribution services. The remaining meetings were held with donors and implementing partners that support and provide health services and commodities in Mali. In-person observations were also recorded at national, regional, district, and local health facilities.

Upon completion of the information gathering phases, GHSC-PSM staff leading the study co-hosted a validation workshop with DGSHP. A total of 15 people from 10 organizations attended. During the workshop, the team disseminated its preliminary findings, confirmed data, and gathered feedback on preliminary proposals to improve availability of the essential NBCH commodities. The proposals were then finalized and are presented as considerations in this report.

Context: Health commodity supply in Mali

Two government agencies work with the Direction Générale de la Santé et d'Hygiène Publique (DGSH) to improve child morbidity and mortality outcomes:

- Direction Pharmacie et Médicaments (DPM) sets pharmaceutical policy and provides governance of medical supplies.
- Pharmacie Populaire de Mali (PPM) provides procurement, warehousing and distribution services for health commodities in Mali.

Another government body worth noting is the Comité Technique de Coordination et de Suivi de la Gestion des Médicaments Essentiels (CTCSGME). This body is chaired by DPM, conducts commodity quantification for Mali, and convenes to troubleshoot supply chain issues.

Commodity movement

Health commodities in the national supply chain are procured by the Malian government and its partners (e.g. UNICEF, GHSC-PSM). The commodities are sourced both locally from domestic suppliers and internationally.

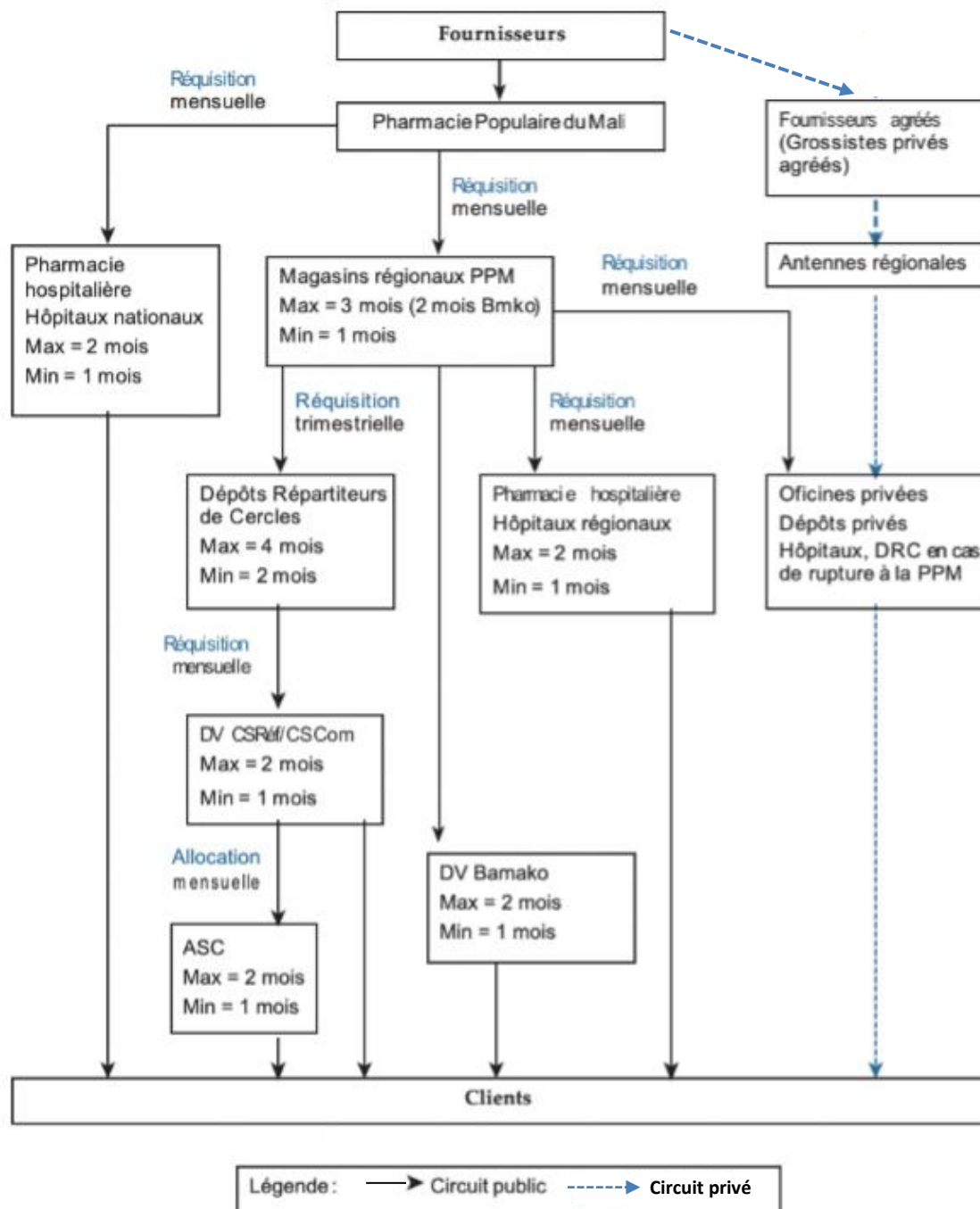
PPM receives essential commodities for storage and management and coordinates distribution of the commodities to Mali's six regional medical stores according to their orders and availability of product at the national level. Commodity orders and deliveries are expected monthly, but in practice this has occurred on more of an ad hoc basis. Similarly, delivery from regional stores to districts deviates from the expected monthly schedule and most commodities are collected directly by district staff from their regional medical store. At the health facility level, commodities are both received and collected from the district and then allocated to community health workers.

The supply chain aims to maintain stock between minimum and maximum levels to ensure commodities are available, but not expiring. For example, reasonable stock levels would include:

- Central level: 6–12 months
- Regional level: 1–3 months
- District level: 2–4 months
- Health facility or post: 1–2 months
- Community health workers: 1–2 months

Figure 1 depicts how commodities move from suppliers, through the supply chain, and reach patients. It shows both the standard national health supply chain and the independent supply that occurs outside of the national system. This separate supply typically occurs when facilities procure directly from the private sector.

Figure 1. National Health Commodity Movement in Mali



Data management systems

Consumption data is reported by pharmacists and facility staff through the *Compte Rendue de Gestion de Stock (CRGS)* form on a monthly basis. This data is collected, aggregated for community health workers and lower-level facilities, and shared with the district. The data is then entered into Mali's electronic data system for health commodities, *Outil de Suivi des Produits de Santé (OSPSANTE)*. This tool captures, tracks, aggregates and analyzes data on the consumption of health commodities around the country. Once entered in OPSANTE, the consumption data is available to DPM at the national

level and used to monitor consumption trends and stock availability. This data also informs national forecasting and supply planning.

Facilities and districts order stock replenishment using the *Bon de Commande* or purchase order form. This process is not integrated with those managed through OSPSANTE. PPM uses *Bon de Commande* information to service the orders but does not collect or review the consumption data that could be gleaned from the forms.

Availability of NBCH commodities

The essential NBCH commodities are not made available to health care providers through the national supply chain system described above. Independent donors instead provide the commodities directly to community health workers and providers at facilities to strengthen services for NBCH. These donors include UNICEF, UN Population Fund (UNFPA), Save the Children and others. The commodities are not provided to national medical stores nor stored and managed by existing logistics systems, including OSPSANTE. The resulting parallel delivery systems lead to incomplete stock level reporting and limited visibility into the actual consumption, stock levels, and availability of NBCH commodities.

After mapping the broader supply chain and context by which NBCH commodities enter the national system, the GHSC-PSM study assessed availability and identified opportunity areas for improving availability for these specific commodities:

- Amoxicillin DT
- ORS+zinc
- Newborn resuscitation equipment

The subsequent sections of this report will demonstrate how they are moved and the challenges to moving them through the supply chain. The report will also propose ways to ensure availability of the commodities to low-resource communities throughout Mali.

Findings: Supply chain challenges for commodity availability

The GHSC-PSM rapid study assessed Mali's supply chain in four realms that typically affect supply chain efficiency. The findings below demonstrate how amoxicillin DT, ORS+zinc, and newborn resuscitation equipment are managed in Mali's public health system and speak to challenges that exist in each of these realms.

Enabling environment

Treatment guidelines and provider practices. The DT formulation of amoxicillin and co-packaged ORS and zinc were not designated as preferred in Mali's standard treatment guidelines and essential medicines list. Interviews revealed that the government and parties responsible for commodity selection had limited awareness of the benefits of amoxicillin in DT formulation. PPM continued to procure other formulations of these commodities, such as individually packaged ORS and zinc and amoxicillin syrup as primary treatment. PPM indicated that a change in the treatment guidelines would impact DPM policies on what formulations and packaging to procure and lead to an update to PPM's procurement list.

Health care providers were often not cognizant of the full suite of benefits that amoxicillin DT, ORS+zinc, and newborn resuscitation equipment offer and did not prescribe or order these commodities. Most commonly, amoxicillin syrup was prescribed for pneumonia and ORS for diarrhea. Zinc was in the standard treatment guidelines but not quantified for use in treatment of diarrhea so was often stocked out. There was limited knowledge on how to utilize newborn resuscitation equipment effectively.

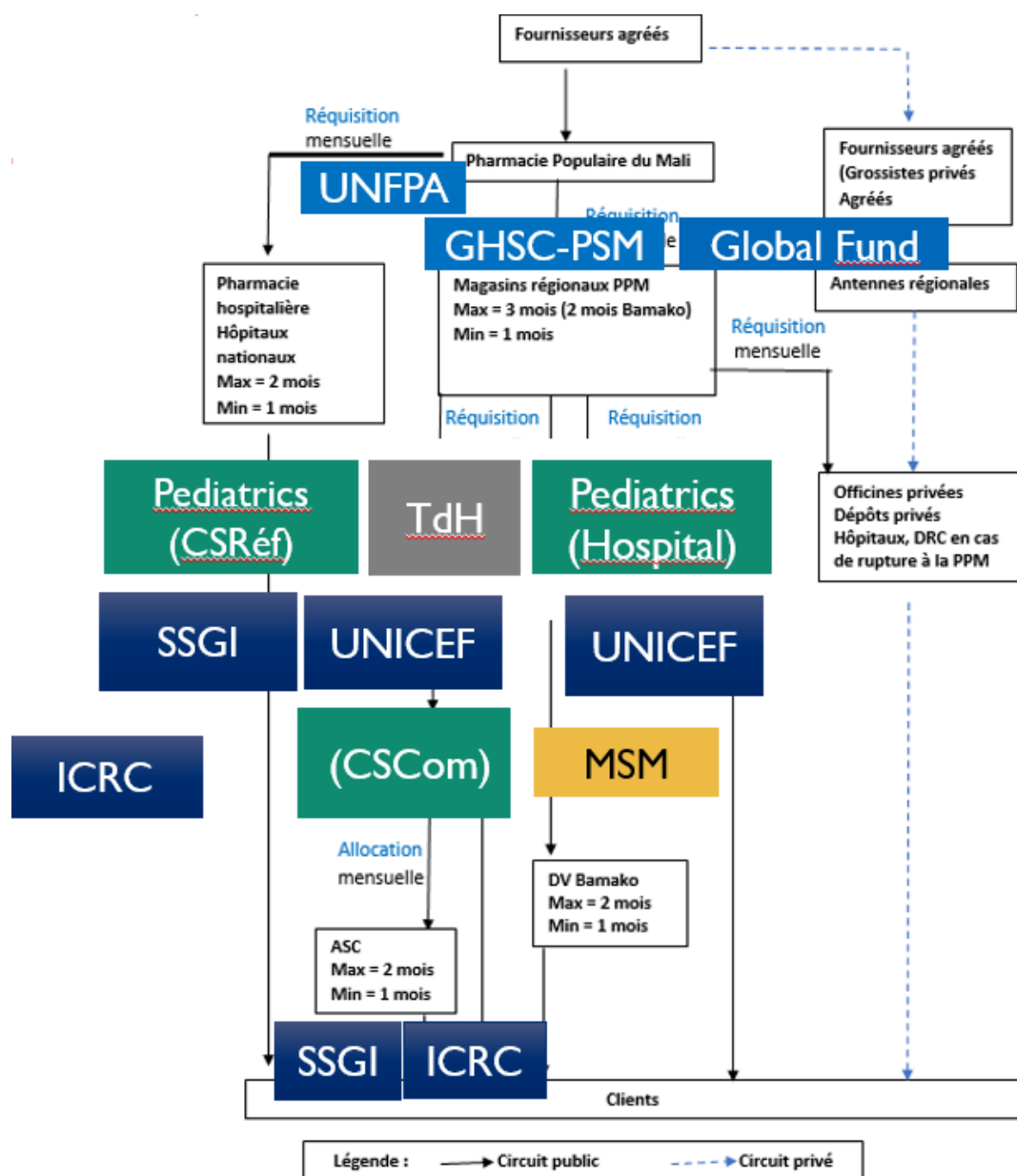
Pharmaceutical and health equipment policy. Amoxicillin DT and ORS+zinc were not included in the formal national supply chain system, but instead informally provided by partners. Additionally, no amoxicillin DT or co-packaged ORS+zinc products were registered in Mali. While waivers are possible, formal registration is preferred to ensure strong regulatory oversight.

Newborn resuscitation equipment was the lone commodity managed through a parallel, ad hoc system created by the health services agency DGSHP. Quantification, procurement, logistics and data collection for newborn resuscitation equipment were also not integrated into the national system. Two separate systems for managing NBCH commodities created inefficiencies such as duplication in human resource and staff managing the newborn resuscitation equipment at DGSHP may have less supply chain experience due to the nature of their typical work.

Health programs. The use of amoxicillin DT, ORS+zinc and newborn resuscitation equipment were fragmented across partners and the programs they manage. The availability of these specific formulations varied widely across health facilities and regional stores, but tended to be concentrated in geographic areas where partners support these health services.

Figure 2 depicts how partners introduce these commodities into Mali's health system. Some donors, such as USAID and Global Fund, deliver commodities directly to the health supply chain agency PPM, while UNFPA provides newborn resuscitation equipment to DGSHP for storage and management. Other partners including Terre des Hommes (TdH), Save the Children (through the SSGI project), UNICEF, and International Committee of the Red Cross (ICRC) procure amoxicillin DT and ORS+zinc directly for service providers in pediatric facilities and for *agents de santé communautaire* (ASC) who provide home-based health services within the community.

Figure 2. Partner Involvement in Mali's National Health System



Supply chain coordination. Inconsistencies that result from uncoordinated partner activities were compounded by the wide-ranging engagement of several Malian government agencies (DGSH, PPM and DPM) in different aspects of the national health supply chain. Noncentralized supply chain coordination may confuse ultimate decision-making authority as DGSH, PPM and DPM all operate on the same governance level.

Financing. No government financial resources had been dedicated to the procurement of amoxicillin DT, co-packaged ORS+zinc and newborn resuscitation equipment.

Forecasting, supply planning and procurement

Forecasting. Forecasts for the commodities were limited.

- Newborn resuscitation equipment had not been forecasted since 2017;
- ORS and zinc were individually forecasted, including for ORS to manage diarrhea and for zinc to be used to treat sickle cell anemia. Zinc had not been individually forecasted for its use to manage diarrhea despite being a part of the treatment guidelines. ORS+zinc co-packaged for treatment of diarrhea had also never been quantified;
- Amoxicillin had not been forecasted in DT formulation, only for syrup formulation using demographics data.

Supply planning. Supply plans were not developed for amoxicillin DT, ORS+zinc or newborn resuscitation equipment; nor for different formulations like individually packaged ORS or amoxicillin syrup. Forecasting would facilitate development of supply plans, which could then be used to advocate for the government funding required to meet the national need for these commodities.

Quantification data. Interviewed members of CTCSGME reported that logistics management information system (LMIS) data was limited and of unreliable quality. As such, quantification activities primarily used demographics and health management information system (HMIS) data instead of LMIS data.

Procurement. Amoxicillin DT, ORS+zinc and newborn resuscitation equipment were not procured by PPM at the time of the study.

Inventory management

No specific challenges could be identified with the handling of amoxicillin DT, ORS+zinc and newborn resuscitation equipment as they were not available through the national supply chain. However, the study identified general limitations related to warehousing and distribution.

Distribution. Mali's vehicle fleet was insufficient to effectively distribute all national health commodities. Delivery is required at multiple levels, from PPM to regional medical stores and between regional stores, districts and facilities, and the existing fleet did not meet those needs. Distribution systems for commodities were also fragmented by product category. For example, HIV-related commodities were delivered to facilities while staff at those same facilities were required to collect certain NBCH commodities in a separate journey.

Several partners reported that facilities did not adhere to the established schedule for ordering commodities. Regional warehouses and district storage facilities could not establish routine delivery routes as they did not know when orders would come in and responded in an ad hoc manner.

Logistics and use

Data collection. As amoxicillin DT and ORS+zinc were not available through the national supply chain, they were not listed in the LMIS data collection tools CRGS and OSPSANTE. Stock data on these commodities were not available to the government.

Data on newborn resuscitation equipment was also unavailable, which eliminated visibility on equipment placement and quantity—two aspects of commodity availability. There was no formal system or process to request equipment replacements.

Because amoxicillin DT, ORS+zinc, and newborn resuscitation equipment were managed by partners and systems parallel to the national supply chain, distribution and consumption data were not

available. This lack of complete consumption data limits the reliability of quantifications and stock balancing between facilities.

Data management. OSPSANTE data quality issues lead to delays in orders, deliveries, redistributions, and overall visibility of health commodity stock management. Efforts to address these issues and improve OSPSANTE, especially by improving the system's monitoring and oversight functionality, could increase efficiencies in the supply chain and improve commodity availability.

Within the government health system, DPM reports on commodity consumption and PPM manages a separate ordering process. There is currently no collaboration or integration between these processes. However, data sharing between DPM and PPM could improve accountability for facilities and ensure reliable supply of essential NBCH commodities.

Considerations to improve availability of essential NBCH commodities

In the final phase of the study, GHSC-PSM analyzed findings, developed potential supply chain solutions to the barriers that were identified, and gathered input from local stakeholders on these solutions. Based on the findings and discussions, GHSC-PSM suggests the following be considered to improve availability of the essential NBCH commodities amoxicillin DT, ORS+zinc, and newborn resuscitation equipment—and ultimately reduce child mortality—in Mali.

Add the commodities to the appropriate standard treatment guidelines and essential medicines and equipment lists

GHSC-PSM suggests that the Government of Mali update its policies and standard treatment guidelines to designate amoxicillin DT and ORS+zinc co-pack as the primary treatment for pneumonia and diarrhea. This policy update will trigger demand for the commodities at the facility level and will help initiate forecasting and supply planning for the commodities by Mali's national quantification body, CTCSGME. With updated policies, partners and donors can advocate that funding be allocated for government-led procurement of these life-saving treatments and equipment for pneumonia, diarrhea and birth asphyxia.

Shift the management of newborn resuscitation equipment from the DGSHP to the national health supply chain

Quantification, procurement and monitoring processes for newborn resuscitation equipment could benefit from integration into the national supply chain and handing by national bodies who have supply chain expertise. This includes DPM, PPM, and CTCSGME. The equipment can be ordered and managed alongside other commodities through the *Bon de Commande* process. This would ensure the equipment is managed in a similar way to other commodities, increase oversight on stock levels, and improve availability and maintenance of the equipment.

While there is not consolidated data on where this equipment is utilized, CTCSGME may consider working with partners and those responsible for managing this equipment at DGSHP to gather information on what equipment has been issued, to which facilities, and when. This information could populate a national register that CTCSGME uses to follow up and confirm the equipment is still functioning. Newborn resuscitation equipment items can be added to OSPSANTE for future monitoring.

Improve coordination between Malian health and supply chain agencies to support management of NBCH commodities

Once national guidelines are updated and the commodities enter the supply chain, GHSC-PSM would advise that DGSHP coordinate DPM, PPM and CTCSGME to sensitize healthcare providers and prescribers to the newly introduced commodities. This would include DGSHP-issued guidance on proper prescribing practices for amoxicillin DT to treat pneumonia and ORS+zinc to treat diarrhea. DGSHP may also advise field-based commodity managers, who are DPM staff, to include these commodities in their orders submitted to PPM.

DGSHP should consider working with DPM and PPM to move newborn resuscitation equipment into national stores and systems, add it to the reporting and ordering forms, and inform and encourage commodity managers to order sufficient equipment to meet their facility's needs. This process will be

most effective if the agencies coordinate activities according to their respective strengths and roles and by following a mutually-agreed-upon timeline.

Once these changes are in place, CTCSGME can monitor availability of the essential NBCH commodities at each level of the supply chain and ensure the transition is occurring as planned. This includes proper ordering, use, and management to prevent expiration.

Include the commodities in the national logistics management information systems (LMIS) and monitor data quality for accurate forecasting and management

GHSC-PSM suggests that the Government of Mali initiate conversations with partners to transition management of the essential NBCH commodities to the national system. This process can be challenging and time-consuming given partner preferences to retain control of program stocks. The first step in this process is to start to gather data on quantities of these commodities (amoxicillin DT, ORS+zinc and newborn resuscitation equipment) received at facilities from partners. This data can be captured through the CRGS form and OSPANTE to create a national picture on total stock of all pediatric formulations of amoxicillin in country. This will require agreement among the government and its partners currently managing these commodities outside the national systems but will increase data available to comprehensively understand country consumption and availability.

Based on study findings and if resources are available, DPM, with support from GHSC-PSM, may consider providing training to supervisors on data quality assurance practices in OSPANTE and how to follow up where reporting indicates potential errors or anomalies. During the integration of partner commodities into the national system, there may be an increased number of errors that should be identified and addressed.

Conclusion and next steps

The GHSC-PSM rapid assessment revealed opportunities to expand access to the essential NBCH commodities amoxicillin DT, ORS+zinc, and newborn resuscitation equipment in Mali. Potential solutions include revising treatment guidelines, establishing quantification processes, and enhancing the LMIS' to include commodity availability data.

Following this rapid study, Mali's Ministry of Health adapted pneumonia treatment protocols that prioritize amoxicillin DT. The MOH also plans to catalyze the use and management of co-packaged ORS+zinc by integrating it into the national health supply chain. CTCSGME has also pledged to meet with the most relevant stakeholders and develop an action plan that aims to increase access to the essential NBCH commodities.

Future rapid studies that home in on the supply of specific commodities can inform policy and practice at the country level with significant life-saving impact for children and newborns.