USAID | DELIVER PROJECT

Zambia

Improving Malaria Prevention, Diagnosis and Treatment by Investing in Supply Chains: Support under the USAID | DELIVER PROJECT

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USAID
PRESIDENT'S MALARIA INITIATIVE
CDC

The USAID | DELIVER PROJECT, Task Order 7, is funded by USAID, implemented by John Snow, Inc., and supports USAID's implementation of malaria prevention and treatment programs by procuring, managing, and delivering high-quality, safe, and effective malaria commodities; providing on-the-ground logistics capacity, technical assistance, and pharmaceutical management expertise; and offering technical leadership to strengthen the global supply, demand, and financing of malaria commodities.

No Product, No Program

The USAID | DELIVER PROJECT (the project) strengthens global, regional, and in-country supply chains to improve and expand the delivery of public health commodities to the people that need them. Under the Malaria Task Order, with funding from the President's Malaria Initiative (PMI) the project is responsible for procuring and distributing antimalarial commodities—long-lasting insecticide-treated bed nets(LLINs), rapid diagnostic tests (RDTs), artemesinin-based combination therapies (ACTs), and sulfadoxine pyrimethamine (SP) – to PMI supported country programs. The project works to improve the global supply and availability of antimalarial commodities and to bolster in-country supply systems.

The project's antimalarial commodities contribute to the reduction of morbidity and mortality due to malaria by preventing transmission of malaria, preventing cases among pregnant women, improving diagnosis, and providing treatment. The project works across the logistics cycle (shown in figure 1) to ensure malaria products are available when and where needed.

The USAID | DELIVER PROJECT has procured commodities[1] for Zambia to:

Treat **35.4 MILLION** malaria cases with ACTs

Test **36.6 MILLION** suspected malaria cases with RDTs

Prevent malaria in pregnancy with **17.9 MILLION** SP Tablets

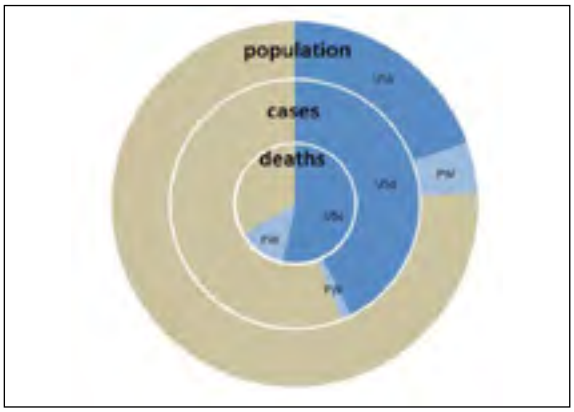
Protect against malaria with **10.6 MILLION** LLINs

Figure 1. The Logistics Cycle

Malaria in Zambia

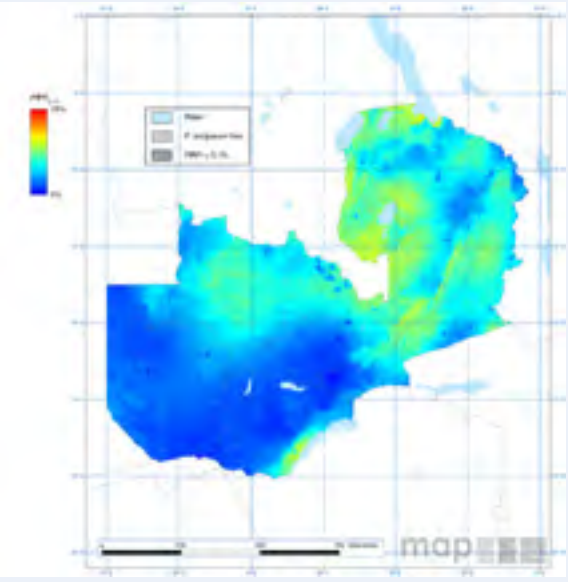
In 2015, 6% of all malaria cases in East and Southern Africa occurred in Zambia. Between 2009 and 2015, there have been at least 30.1 million recorded cases of malaria and over 30,010 deaths in Zambia. In 2015, malaria affected more than 2.9 million Zambians , resulting in 7,900 deaths. Almost half of these cases occurred in children under the age of 5 (U5s).

Figure 2. Disproportionate Burden of Malaria Cases and Deaths Among Women and Children



Zambia's population of U5s and pregnant women comprise 25% of Zambia's population, but accounted for 44% of malaria cases and over 75% of cause-specific mortality deaths . This disproportionate burden is illustrated in figure 2. Because of their particular vulnerability to malaria, children under the age of five and pregnant women are primary target populations. Figure 3 shows the spatial distribution of plasmodium falciparum malaria endemicity in 2010.

Figure 3. The Spatial Distribution of Plasmodium Falciparum Malaria Endemicity, Zambia 2010[2]



EPIDEMIOLOGICAL PROFILE[4]
First-line Treatment: Artemether-Lumefantrine
Rainy Season: November–June
Population living in high transmission areas : 100% *(parasite distribution across Zambia shown in Fig. 3)*[3]
U5s at risk: 2,744,625 (19.5% of the population)[4]
Incidence: 25,242/100,000[5]
Cases per year: 5,462,078[1]
Cases among U5s: 2,327,974[1]
Cases among Pregnant Women: 70,527[1]

[1] World Malaria Report, 2016

[2] ©2010 Malaria Atlas Project, available under the Creative Commons Attribution 3.0 Unported License. (http://www.mapox.ac.uk/browse-resources/endemicity/Pf_mean/ZMB/)

[3] <1 case/1000 people

[4] Zambia 2010 Census

[5] http://www.who.int/gho/publications/world_health_statistics/EN_WHS2013_Full.pdf

[6] Based on data available in the HMIS

The USAID | DELIVER PROJECT in Zambia

The project established a field office in Lusaka and began working in Zambia in 2005, and malaria activities began in 2007. Since that time, the project has contributed towards the USG objective of halving the malaria burden in 70 percent of the at-risk population of sub-Saharan Africa by accelerating malaria prevention and treatment efforts, building national capacities, and strengthening key health systems. Zambia has been a PMI focus country since 2006.

The project works closely with the Zambian Ministry of Health (MoH), the Ministry of Community Development Mother and Child Health (MCDMCH), the National Malaria Control Commission (NMCC), Medical Stores Limited (MSL) and USAID/ Zambia to strengthen the in-country supply chain system, improve availability of commodities, and build capacity. The project envisions achieving these goals through continued close coordination and collaboration with USAID, government counterparts and other partners to ensure a sustainable, transparent, coordinated, recipient government owned system.

Supporting and providing mentoring for the full transition of quantification activities to the MOH

Some of the earliest project activities in Zambia include capacity building and assistance with the forecasting and quantification of malaria pharmaceuticals. The project has assisted the MoH, MCDMCH, and NMCC in carrying out several long-term national forecasts and quantifications for malaria commodities to complement procurement activities.

The project worked closely with counterparts at the NMCC and other key cooperating partners to support and provide mentoring for the full transition of quantification and forecasting activities to the MoH. To facilitate this transition and institutionalize the process of coordinated, transparent forecasting and quantification activities in the MoH and MCDMCH, capacity building activities have included developing a national core team, including district and provincial staff, to support the quantification process.

Results from quantifications have highlighted funding gaps, and the MoH has subsequently been able to use this information to mobilize funding to fill the gaps. For example, since 2013 the MoH now has a budget line item for procuring malaria commodities, which has been used for items such as ACTs, RDTs, and indoor residual spraying (IRS).

Providing commodities through a successful joint program with the Zambian Government and DFID

Cost-effective, reliable procurement is a key activity of the project in supporting the MoH to ensure full supply of anti-malarial commodities and select essential medicines. Since 2008, the project has procured malaria commodities with PMI funding and beginning in 2010, the project has also undertaken procurements using Department for International Development (DFID) funds obligated through USAID. DFID's original 2010 funding contribution allowed the

Zambian Government to fill commodity gaps brought about by delays in donor funding. This collaboration assisted the MoH to quickly respond to an increase in malaria parasitemia and severe anemia observed in children under age five in three provinces through procurement and distribution of one million bed nets within the affected provinces.

*Table 1. Commodity procurement over the life of the project**

Total Quantity Procured by Funding Type				
Commodities	**PMI**	**DFID**	**PEPFAR**	**TOTAL**
ACTs	17,814,840	17,549,550		35,364,390
LLINs	7,429,401	2,442,870	723,350	10,595,621
RDTs	21,355,600	15,300,000		36,655,600

Following the success of this joint program with the Zambian Government and USAID, DFID has continued support for procurement of malaria commodities (and expanded the scope to include other essential medicines) from the period 2011 through 2015. Through a memorandum of understanding with USAID, this DFID funding has been used by the project for the procurement and distribution of anti-malarial commodities and essential medicines for the prevention and treatment of childhood illnesses and to support the Essential Medicines Logistic Improvement Program (EMLIP) to strengthen drug supply in the public health sector.

Improving product availability through the Essential Medicines Logistics Improvement Program (EMLIP)

The USAID |DELIVER PROJECT worked closely with partners to improve in-country supply chain systems and capacity.

A baseline survey conducted by the project and the MoH at the end of 2008 found high stockout rates at the health facility level for a range of essential medicines; for A/L the stockout rate was approximately 40 percent for all four presentations. ACTs were managed as part of health center kits, which were allocated to facilities based on nationally-determined (population-based) allocations rather than consumption at individual facilities.

To address this, the project and other partners devised a new system, EMLIP, which was rolled out as a pilot to 16 districts in 2009. Product availability was significantly increased: the stockout rate for adult ACTs was reduced from 48 to 6 percent and for pediatric ACTs was reduced from 43 to 12 percent. In addition to reduced stockout rates, the number of days out of stock was reduced. Figure 4 shows the days of ACTs and SP stocked out in the EMLIP facilities versus the control facilities. Over time, Zambia has seen declining stock out rates of ACTs and RDTs at EMLIP facilities (Figure 5).

Figure 4. Days of Stockout During Pilot Period

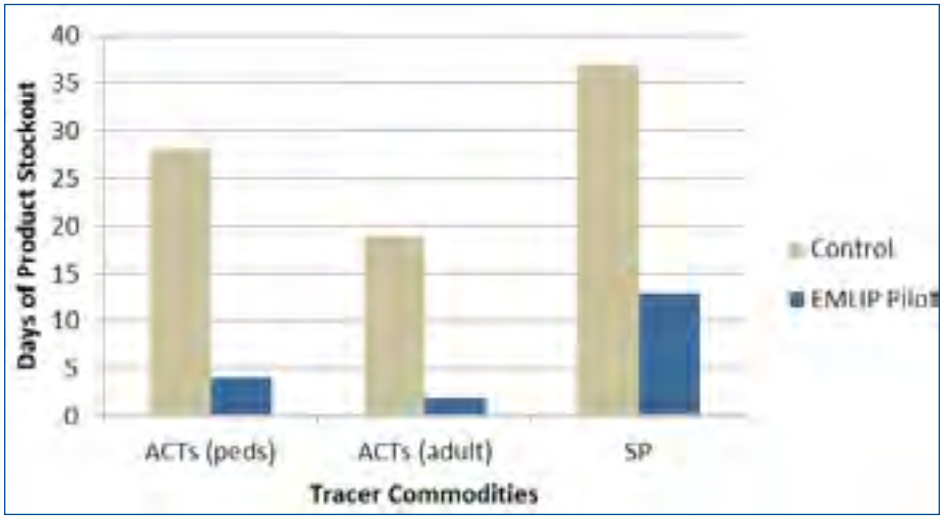
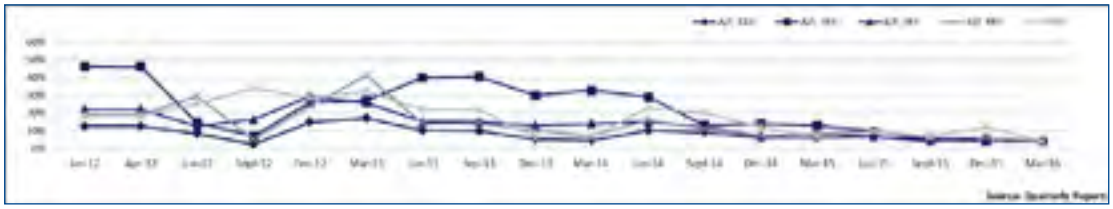
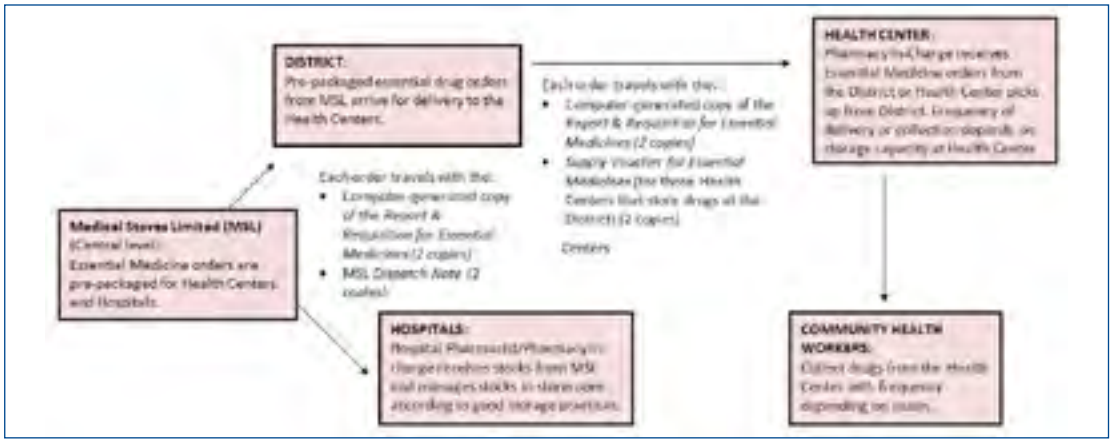


Figure 5. Percent Of Emlip Faciliites Stocked Out Of ACTs And RDTs over Time



EMLIP is a demand driven system, where facilities submit essential logistics data to their respective district medical offices (DMOs). The DMOs in turn follow a predetermined, fixed schedule for submission of reports to the Logistics Management Unit (LMU), housed at Medical Stores Limited (MSL). Once received, LMU determines the order quantities to be picked and packed at MSL for specific facilities. After the report is processed at LMU, MSL picks and packs by particular health facility

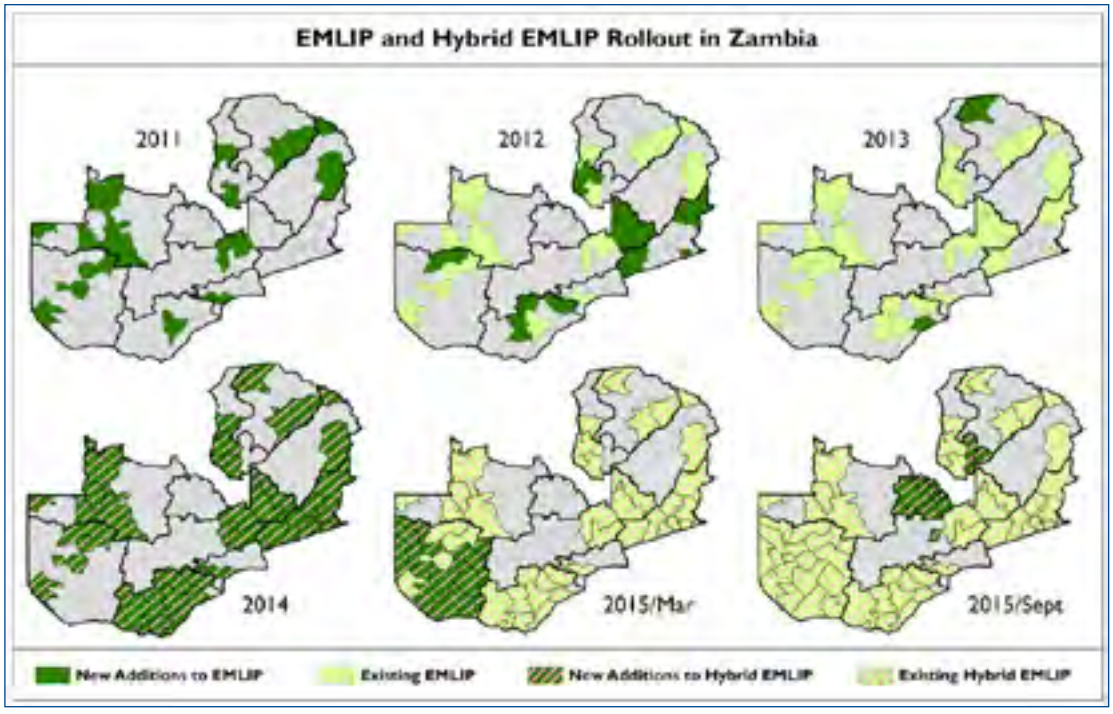
Figure 6. Distribution and Flow of Commodities within the Essential Medicines Logistics Improvement Program



and dispatches the consignment via the regional MSL hub (in collaboration with the respective DMO), following the MSL monthly distribution cycle. Each consignment is accompanied by documentation, issued to ensure tracking of commodities up to the final destination. The DMOs are then responsible for delivery of commodities to health facilities within their catchment areas. (See Figure 6 for the detailed flow of information and commodities).

However, there were several factors that affected the ability of EMLIP to function as designed, and a review of EMLIP produced recommendations for a further modified hybrid system. The primary change of the hybrid system includes distribution of some commodities through kits to health centers; only two anti-malarial commodities, quinine tablets and injections, are included in these kits. In the hybrid system, the district now also holds one month of stock of key drugs for emergency distribution purposes. Facilities are currently being trained to include essential logistics data for commodities contained in the kit as they report upstream, to inform LMU/MSL on the specific quantities to be sent downstream to the facility. As shown in Figure 7, a staggered rollout of this system continues. By mid-2014, all districts that previously implemented EMLIP were transitioned to the hybrid system. By September 2015, roll-out was achieved in 75 out of 103 districts , with at least one district representation from all ten provinces. Rollout was completed in all 103 districts in September 2016.

Figure 7. Expansion of Emlip and Hybrid-Emlip Implementation across Zambia



Establishing the LMU as a key step in logistics system strengthening

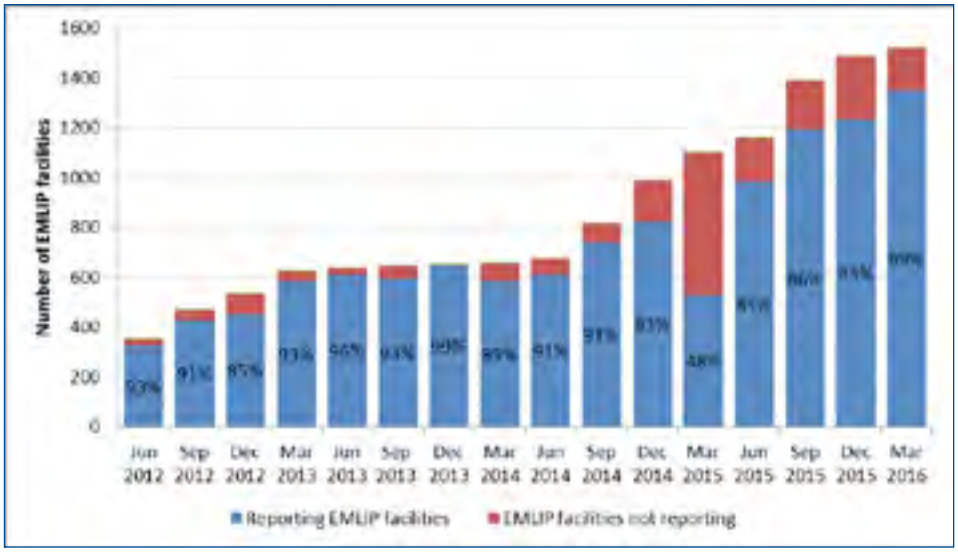
A key step in strengthening the logistics systems has been the introduction of the LMU, managed by staff initially funded by the project. Prior to the establishment of the LMU, review and approval of orders from districts (on behalf of health centers) and hospitals was done by one individual at MoH headquarters. This was determined to be a bottleneck in ensuring quick turnaround on orders. If the individual was out of the office, district or facility staff would have to wait in Lusaka until their order was approved. This would increase the costs to the requisitioning facility, as staff would be out of office for extended periods and unavailable to provide client services.

By the close of FY 2010, the project transitioned management of the LMU to MSL staff. This unit is charged with collecting and analyzing data from the various health facilities and makes these data available for use in decision making. The LMU collects data from ART sites, HIV testing sites and the EMLIP sites, including data on malaria and family planning products, and analyzes this data using an automated system. Data captured and analyzed at LMU are used to inform resupply decisions to health facilities and to inform the forecasting and quantification processes to replenish stock at the central level. As a result of the work of the LMU, the MoH is now able to use facility-level data for anti-malarial commodity quantification.

As shown in Figure 8 there have been an increasing number of EMLIP facilities that regularly submit reports to the LMU and a generally sustained high reporting rate . Since the LMU transition to MSL, reporting rates have improved, as staff see a clear link between reporting and resupply. There is an increased appreciation of the need to maintain accurate inventory records and submit timely reports, in order to receive adequate commodity quantities on schedule.

The project provided mentorship to the LMU to ensure continued quality standards are met, and with the goal of building in-country capacity for sustainable management that is ultimately not project-dependent.

Figure 8. EMLIP Facilities Submitting LMIS Data



Facilitating data sharing and transparency through the eLMIS:

In addition to improving the quality, timeliness, and coverage of data from hybrid EMLIP facilities, since FY 2012 the project supported the MoH with building and implementing an innovative, internet-based information technology solution, the electronic Logistics Management Information System (eLMIS), to service all facilities (hybrid EMLIP and non-EMLIP alike) in Zambia. The system computerizes the collection and reporting of essential logistics data to reduce the paperwork burden on health facility staff and increase the visibility of data to all stakeholders and decision makers.

The eLMIS aims to empower health staff with the evidence they need to make better supply chain management decisions, leading to reduced stockouts and better health outcomes (see Figure 9). The software has been rolled out to 250 sites as of June 2016. Although the eLMIS will not reach every single facility in Zambia, these 250 facilities are considered a nationwide rollout: they comprise high-volume sites in the country that are handling the majority of commodities. This work has been carried out in collaboration with the Government of Tanzania and in partnership with the Open LMIS initiative. The initiative aims to make the eLMIS software code open source, so any country can adapt and use it to strengthen its own health supply chain.

Supporting improvements in key malaria indicators

Availability of key malaria products is critical to help reduce malaria related morbidity and mortality. When used properly as part of comprehensive interventions, these can prevent and treat malaria.

- Vector control – Use of LLINs reduces all-cause mortality among U5s by approximately 55% in Sub-Saharan Africa.[9]In addition, LLINs have reduced malaria incidence in field trials by more than 50% in field trials in a variety of settings.[10]
- Intermittent Preventive Therapy in pregnancy (IPTp) – Administration of SP during antenatal clinic visits in the second and third trimesters of pregnancy has been shown to reduce severe maternal anaemia[11], low birth weight[12] and perinatal mortality[13].
- Ensuring rational use of anti-malarial medicines through testing (microscopy, RDTs).
- Timely treatment with first-line drugs – ACTs have been estimated to reduce uncomplicated malaria mortality in children ages 1–23 months by 99% and in children ages 24–59 months by 97%.[10]

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[9] Thwing J., Eisele T.P., Steketee R.W. Protective effi cacy of malaria case management and intermittent preventive treatment for preventing malaria mortality in children: a systematic review for the Lives Saved Tool. BMC Public Health, 2011 11 Suppl 3:S14.

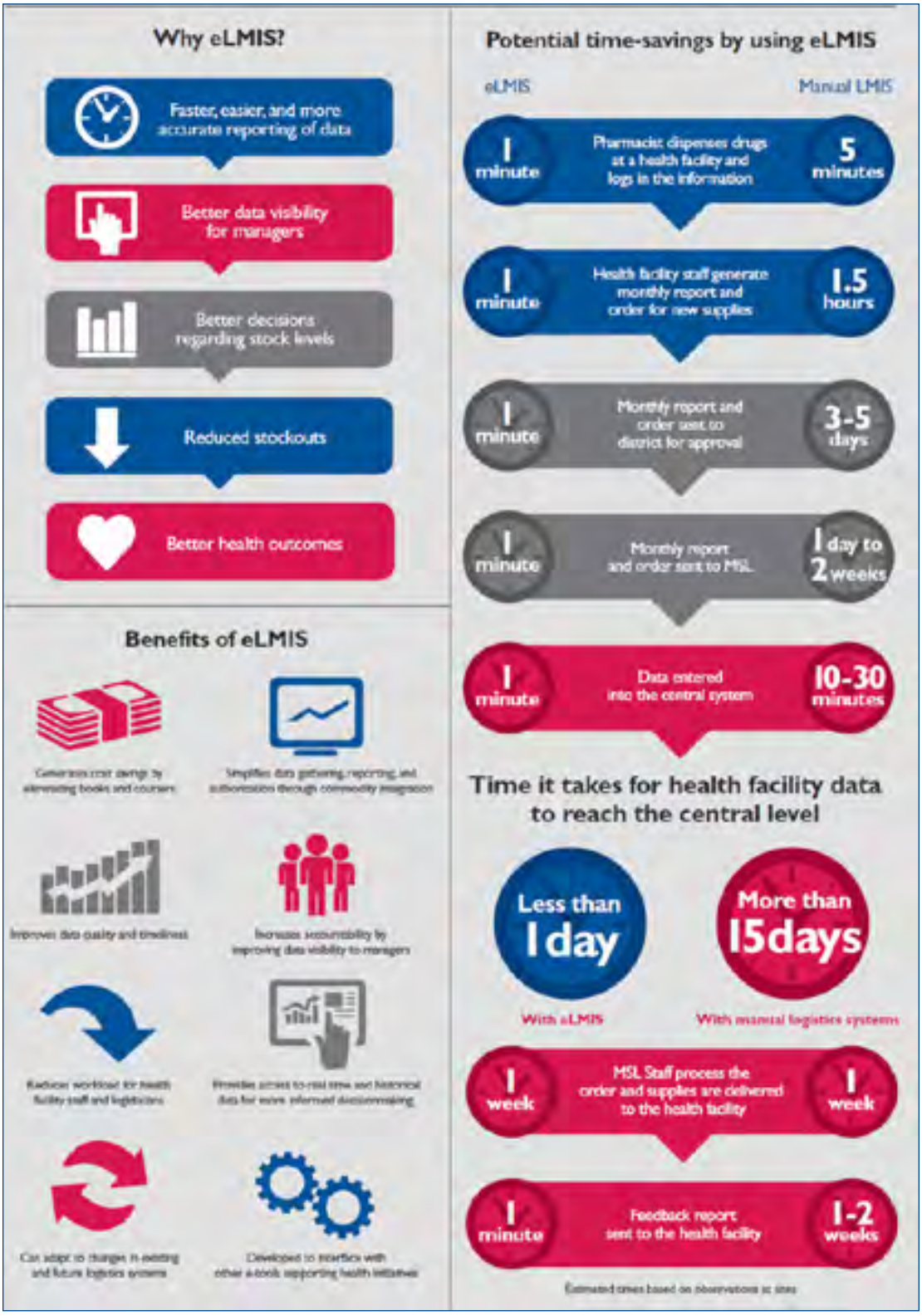
[10] Lengeler C. Insecticide-treated bed nets and curtains for preventing malaria. Cochrane Database Syst Rev. 2004;(2):CD000363.

[11] Radeva-Petrova D., Kayentao K., ter Kuile F.O., Sinclair D., Garner P. Drugs for preventing malaria in pregnant women in endemic areas: any drug regimen versus placebo or no treatment. Cochrane Database Syst Rev, 2014 10:CD000169.

[12] Kayentao K., Garner P., van Eijk A.M., Naidoo I., Roper C., Mulokozi A. et al. Intermittent preventive therapy for malaria during pregnancy using 2 vs 3 or more doses of sulfadoxine-pyrimethamine and risk of low birth weight in Africa: Systematic review and meta-analysis. JAMA, 2013 309(6):594–604.

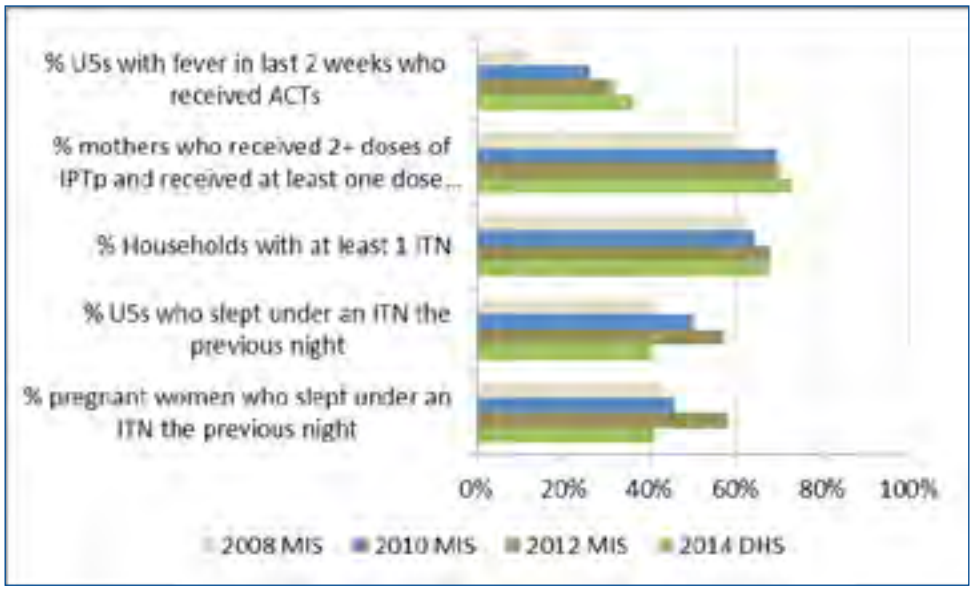
[13] Garner P., Gulmezoglu A.M. Drugs for preventing malaria-related illness in pregnant women and death in the newborn. Cochrane Database Syst Rev, 2003 (1):CD000169.

Figure 9. Working to Improve Health Outcomes in Zambia through the Elmis



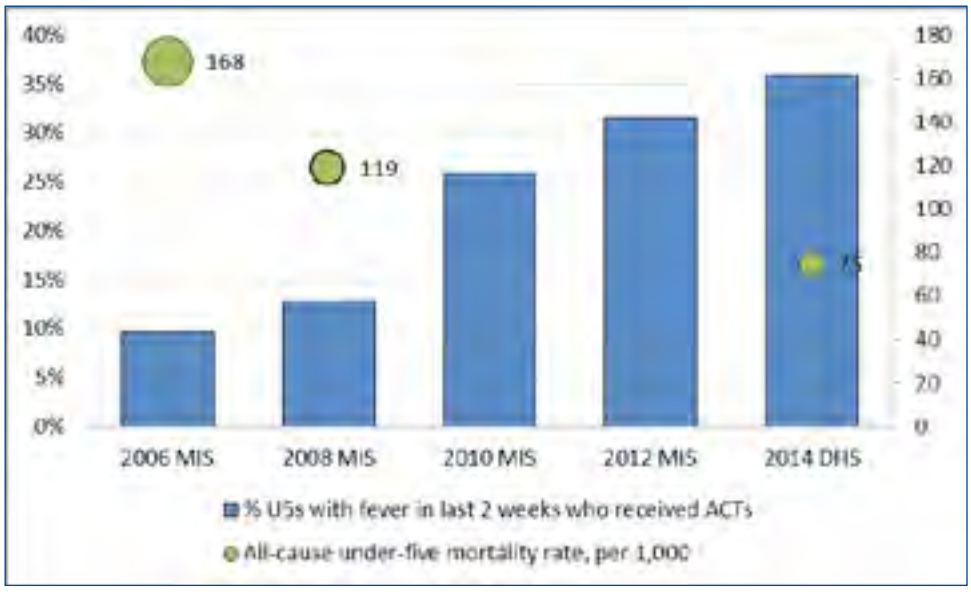
Survey data from the Zambia Malaria Indicator Survey and Demographic Health Surveys (Figure 10) indicate overall improvements in LLIN coverage and ACT and IPTp use during years overlapping with roll-out and implementation of project activities. (However, actual use of nets, as opposed to net coverage, appears to have recently declined in 2014.)

Figure 10. Commodity use for Malaria Prevention, Diagnosis and Treatment



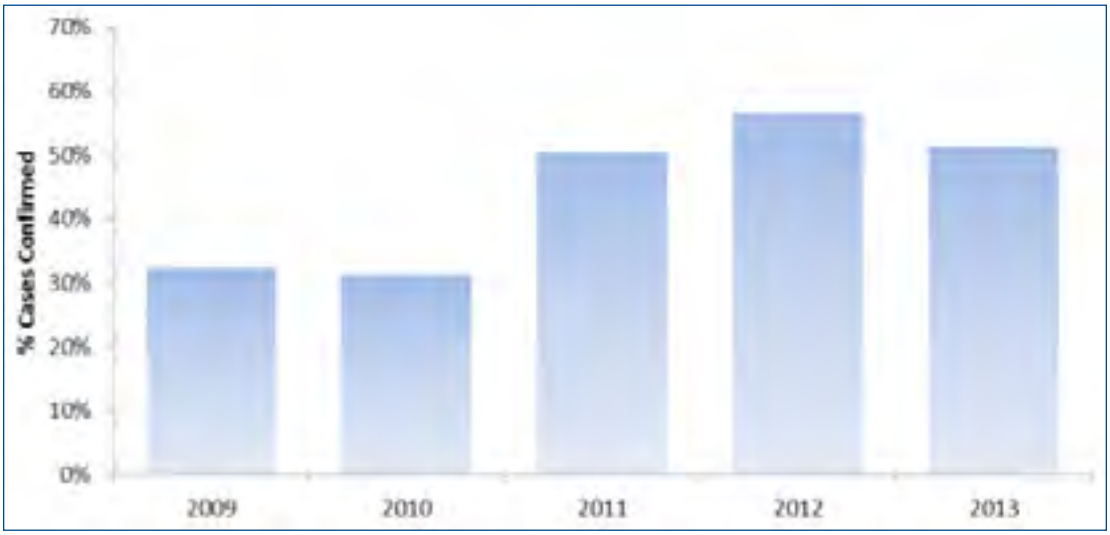
By preventing transmission of malaria, preventing cases among pregnant women, improving diagnosis, and providing treatment, anti-malarial commodities like those procured by the project reduce morbidity and risk of mortality due to malaria. As timely, effective treatment with ACTs has increased, the under-five mortality rate has also declined (Figure 11).

Figure 11. Percent of Under-Fives Treated with ACTs and Under-Five Mortality, over Time



As procurement of tests and treatments has increased, keeping pace with rising numbers of recorded cases at clinics, the percentage of cases confirmed by RDT or microscopy has also increased. In 2009, just 32 percent of total cases were laboratory confirmed; by 2013, those with an RDT- or smear- diagnosis comprised more than half of total cases (Figure 12).

Figure 12. % of Recorded Malaria Cases with Laboratory Confirmation Oo Diagnosis (Via RDT or Microscopy)



The number of clinically confirmed cases has not changed significantly over the last five or six years, while the number that is laboratory confirmed has nearly doubled, possibly indicating capture of cases that may have otherwise gone untreated. Treatments procured by the project have increased over the last five years in an effort to meet demands. To address the number of cases that continue to be clinically confirmed, the project has collaborated with the NMCP in order to improve adherence to both diagnostic and treatment guidelines. Through data collection during End Use Verification survey visits, the project analyzed data to determine if staff are following diagnostic and treatment guidelines. Following data analysis, the project made recommendations to NMCC to provide more training on malaria case management, as needed.

Reductions in malaria morbidity and mortality are dependent on a number of factors that include supply chain management. PMI's efforts through the project have sought to ensure that supply chain is not a limiting factor by improving availability of commodities for prevention, diagnosis, and treatment. Increased investment in procurements and improved capacity in supply chain management have potentially contributed to these reductions alongside other stakeholder activities to improve health seeking behavior and case management.

Looking Forward:

Through implementing partners, and in partnership with the Ministry of Health and other organizations, the USAID | DELIVER PROJECT develops and strengthens reliable and sustainable public health supply chains to ensure that malaria commodities are delivered to the beneficiaries who need them. The project regularly monitors and assesses progress to ensure that activities address current and future needs.

The USAID | DELIVER PROJECT has been a key player in meeting Zambia's needs for malaria prevention, diagnosis, and treatment. Improving access to malaria commodities by strengthening the supply chain is crucial to meeting these needs. Moving forward, it is recommended that supply chain work in collaboration with the Government of the Republic of Zambia focus on the following key areas:

- Roll out the eLMIS to all eligible facilities, and continue to use data from eLMIS for informed decision making and to inform supply chain actions.
- Following the national implementation of EMLIP, continue to monitor its performance in terms of ensuring product availability. Make changes as necessary.
- Build the capacity of the LMU in data analysis and management.
- Ensure appropriate pharmaceutical grade warehousing throughout the supply chain.

[1] These commodity figures come from the project's MIS (up to September 2016) and may not completely align with the PMI annual report figures due to differing timeframes, definition of data, and other country specific reasons.

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