



Short Communication

Pilot assessment of supply chains for pharmaceuticals and medical commodities for malaria, tuberculosis and HIV infection in Ethiopia

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ABSTRACT

To obtain preliminary data on the drug supply management system in Ethiopia, selected facilities were assessed for the availability of essential drugs and commodities for malaria, TB and HIV. Of the 48 surveyed hospitals and health centers, 9 (19%), 9 (19%) and 10 (21%) did not have malaria, TB or HIV drugs, respectively. Similarly, of 27 health posts, 9 (33%) and 6 (22%) did not have rapid diagnostic tests and antimalarial drugs, respectively. The findings indicated an inadequate availability of essential drugs and commodities in the surveyed facilities as well as weaknesses in human resources and training. Assessments of commodity supply chains to ensure operational program success and impact are important.

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1. Introduction

Ethiopia has one of the highest burdens of disease in Africa from malaria, TB and HIV,¹ adding substantial challenges to its healthcare infrastructure. Since 2005 the country has scaled-up operational programs to tackle these three diseases, primarily due to the availability of substantial resources provided by the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM), and the U.S. President's Emergency Plan for AIDS Relief (PEPFAR). Healthcare systems in many developing countries have weaknesses in supply chains and rational use of pharmaceuticals, laboratory reagents, and other medical commodities.^{2,3} Providing continuous access to essential drugs, laboratory services

and medical supplies is fundamental to addressing the healthcare needs of all patients. The objective of the work reported here was to obtain preliminary data on the drug supply management system to determine the state of the system and identify areas of need for developmental assistance as part of a health systems strengthening project in Ethiopia. Although the assessment primarily focused on malaria, it also included some TB and HIV commodities.

2. Materials and methods

In October 2008, qualitative and quantitative information concerning malaria, TB and HIV essential drugs and commodities were collected. We used questionnaires, structured survey tools, interviews of healthcare workers, and direct observations of a convenience sample of 158 administrative health offices and health facilities selected in cooperation with regional government health officials which included zonal health offices (ZHO; n = 21), district

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health offices (DHO; n=27), tertiary hospitals (n=19), secondary health centers (n=29), primary health posts (n=27) and private healthcare facilities (n=35). Availability of the following commodities was assessed at ZHO and DHO stores and the health facility stores and dispensaries: artemether–lumefantrine (AL); chloroquine (CQ); injectable quinine (QI); oral quinine (QO); fixed-dose combination rifampicin, isoniazide, pyrazinamide and ethambutol (RHZE); fixed-dose combination zidovudine/lamivudine (AZT/3TC); malaria rapid diagnostic tests (RDT); disinfectant; gloves; and condoms. We assessed whether health workers at surveyed facilities had access to the latest Ethiopian national malaria diagnosis and treatment guidelines,⁴ and if they had had training on malaria drug management and the guidelines. Data was compiled into a Microsoft Excel database list (Microsoft Corp., Redmond, WA, USA), cleaned and analyzed using descriptive statistics.

3. Results and Discussion

Two hundred and forty health workers were surveyed at the 158 facilities. Availability of essential medications and other medical supplies in the facilities was variable (Table 1). Of the 48 surveyed hospitals and health centers, only 29 (60%) and 38 (79%) had disinfectant and gloves, respectively and 9 (19%), 9 (19%) and 10 (21%) did not have malaria, TB or HIV drugs, even though these facilities provided services to manage such patients. Of all malaria cases in Ethiopia, an estimated 70% are diagnosed with RDTs and treated with antimalarial drugs at rural health posts; however, only 18 (67%) health posts had RDTs, and 21 (78%) had AL and 8 (30%) had chloroquine, the first-line treatments

for *Plasmodium falciparum* and *P. vivax*, respectively. The survey also showed that despite stockouts in public health facilities, zonal and district level stores had a considerable amount of the commodities surveyed, suggesting maldistribution of commodities from zones to districts and from district stores to health facilities. Private sector outlets had only a limited number and amount of the commodities surveyed, which reflects the free provision of services for malaria, TB and HIV by the public sector. Although 15 (31%) hospitals and health centers reportedly had healthcare workers trained on malaria drug management and the Ethiopian national malaria diagnosis and treatment guidelines,⁴ only 9 (19%) facilities had copies of the guidelines. Of the 35 private sector outlets, 26% incorrectly responded that sulfadoxine–pyramethamine was the recommended treatment for *P. falciparum* rather than AL⁴; none of the 21 surveyed pharmacy staff from public hospitals made this error. Health professionals reported loss of products at 1/29 (3%) of health centers, 1/18 (6%) of ZHOs and 4/27 (14%) of DHOs (Table 1).

Although shortage of certain commodities reflects compliance with official government policy [e.g. only 3 (16%) hospitals had malaria RDTs in stock, but at these facilities the current policy is to diagnose malaria by microscopy], we observed considerable weaknesses of the pharmaceutical supply chain, training and healthcare support systems. The occurrence of expired drugs and stockouts of disinfectants and gloves in surveyed health facilities also highlights the need for safe disposal of expired pharmaceutical products and medical waste,⁵ and suggests the potential for biosafety, cross-infection and occupational health risks. Caveats of this study are the use of a convenience sample

Table 1
Survey results of medical commodity, drug supply and training guidelines by health facility or administrative office

	Public sector health facility			Public sector administrative health office		Private sector
	Hospital n = 19 n (%)	Health center n = 29 n (%)	Health post n = 27 n (%)	Zonal health office n = 21 n (%)	District health office n = 27 n (%)	Outlet n = 35 n (%)
Medical commodity in stock						
Artemether–lumefantrine	14(74)	25(86)	21(78)	19(90)	18(67)	7(20)
Artemether–lumefantrine (expired)	5(26)	2(7)	9(33)	0	1(4)	0
Chloroquine, tablets	15(79)	24(83)	8(30)	10(48)	14(52)	32(91)
Chloroquine, tablets (expired)	1(5)	2(7)	0	1(5)	2(7)	0
Quinine, injectable	15(79)	14(48)	NA	14(67)	11(41)	NA
Quinine, injectable (expired)	1(5)	3(10)	NA	2(10)	4(15)	NA
Quinine, tablets	14(74)	20(69)	5(19)	15(71)	14(52)	15(43)
RHZE	16(84)	23(79)	NA	19(91)	18(67)	NA
AZT/3TC	17(90)	21(72)	NA	NA	NA	NA
Malaria RDTs	3(16)	12(41)	18(67)	18(86)	18(67)	NA
Malaria RDTs (expired)	0	0	7(26)	1(5)	2(7)	NA
Gloves	17(90)	21(72)	NA	NA	NA	NA
Disinfectant	11(58)	18(62)	NA	NA	NA	NA
Condoms	13(68)	20(69)	17(63)	15(71)	17(63)	30(86)
Malaria guidelines and training						
National malaria diagnosis and treatment guidelines available	4(21)	5(17)	NA	15(70)	19(70)	NA
Staff attended malaria case management training within past 3 years	2(11)	13(45)	14(52)	4(21)	6(22)	8(23)
Facilities with reported theft problems	NA	1(3)	NA	1(5)	4(15)	NA

NA: not assessed or not applicable, as commodities would not be found at those sites; RHZE: combined rifampin, isoniazide, pyrazinamide and ethambutol; AZT/3TC: combined zidovudine/lamivudine; RDTs: rapid diagnostic tests.

and the surveying of a limited number of ‘tracer’ drugs and commodities. Moreover, the study only assessed whether a tracer drug or commodity was present, absent or expired; we did not, for example, quantify the commodities assessed or record what proportion of drugs available had expired.

Literature about pharmaceutical management systems in developing countries is scarce. A study of several other East African health systems identified human resource deficiencies in managing pharmaceuticals and commodities, recommending on-the-job training to minimize time away from primary workplaces.⁶ Similarly, in Ethiopia human resources constraints exist, and pre- and in-service training is recommended as a strategy to address this challenge.⁷ However, there is no shortage of pharmacists and pharmacy technologists, who have 4 and 2 years of training, respectively. Hospitals and health centers are required to have at least one pharmacist. Pharmacies are required to be owned by pharmacists, whereas drug stores or rural drug shops can be owned by either pharmacists or pharmacy technologists. Although public and private sector drug outlets and service providers are regulated by the Regional Health Bureaus and the Ethiopian Food, Health, Medicine Administration and Authority, no established standardized job descriptions or on-the-job training requirements for these providers exist. Clearly, shortages of critical drugs and medical supplies in health facilities may reduce access to proper healthcare services, compromise appropriate clinical management of cases, and ultimately could contribute adversely in reducing morbidity and mortality from malaria, TB and HIV. Given the substantial investments into developing countries’ health sectors (e.g. through the GFATM or PEPFAR), including for establishing or strengthening commodity supply chains, in-depth assessments to identify such systems’ weaknesses, failures and successes are of paramount importance.

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Authors’ contributions: GD, HT, TD and RR designed the survey protocol and questionnaire; GD and HT coordinated and guided the implementation of the survey, including data entry and analysis; TD and RR led the drafting of the manuscript, which GD and HT assisted. All authors read and revised the manuscript for accuracy and intellectual content and approved the final version. RR is guarantor of the paper.

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Conflicts of interest: None declared.

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