WHO assessment of UNITAID supply of ACT to Burundi and Liberia

Summary Report

BACKGROUND

In March 2007, UNITAID signed with UNICEF and WHO an agreement for emergency supply of ACTs to Burundi and Liberia, in order to avoid interruption of supply of life-saving medicines following the termination of GFATM R2 and R3 grants, respectively, and the unsuccessful application to R5 and R6 by both countries.

As an emergency measure, WHO oriented donations from Sanofi-Aventis of artesunate+amodiaquine with limited shelf-life to both Liberia (July 2006) and Burundi (November 2006). These donations were relatively small (i.e. 135'650 and 110'000 treatment courses, respectively) covering less than 10% of the annual need in both countries. In November 2006, WHO submitted a request to UNITAID for the supply of the 2007 unmet needs for ACTs in Burundi and Liberia, amounting to 714,997 and 608'400 treatment courses, respectively.

UNITAID selected UNICEF as Procurement Agent, which delivered 678,875 treatment courses to Liberia in June 2007 and 722,953 treatment courses to Burundi in August 2007. As part of the agreement, UNICEF allocated USD 500'000 to cover all in-country operational costs related to drug distribution and supply management and WHO allocated USD 50'000 to in-country monitoring activities. WHO submitted an interim report to UNITAID on 31 August 2007.

The present document describes the objectives, methodology and results of the survey implemented by WHO in collaboration with the national health authorities to evaluate the effectiveness of the UNITAID project in avoiding ACT supply shortages in Burundi and Liberia in 2007. While the complete report with full analysis of the data collected is under preparation, the present report provides the main findings of the survey to serve as evaluation of the UNITAID project.

OBJECTIVES OF THE SURVEY

- To evaluate the overall effectiveness of UNITAID grant in ensuring uninterrupted supply of ACT to both Burundi and Liberia

PRIMARY SURVEY INDICATORS

The effectiveness of the project has been monitored through the following agreed indicators related to the geographical areas and the timeframe of UNITAID supply of ACTs to both countries:

1. proportion of health units with no "stock out" of ACT
2. proportion of patients treated with ACT
3. malaria case fatality rate in hospitals and health centers with admission facilities

HYPOTHESIS TESTING

The "success" of the UNITAID project, in ensuring uninterrupted supply of ACTs, should be associated with a lack of change of the above indicators (number of patients treated with ACTs, proportion of health facilities with ACT stock-outs, inpatient malaria case fatality rate), compared to historical controls. An "improvement" of the above indicators was not the objective of the project, and may not be related to UNITAID contribution only. A clear "deterioration" of the situation, if documented, will need to be investigated.

SURVEY METHODS

The period of reporting covered the years 2005, 2006 and 2007. The UNITAID "intervention period" corresponds to the 3rd and 4th quarter of 2007 (time of delivery of UNITAID sponsored medicines to both countries). The same time quarters (Q3 and Q4) for 2005 and 2006 were selected as historical controls.

To provide consistent conclusions, the indicators have been analysed in 9-12 districts (to which UNITAID ACT have been supplied). The 9-12 districts were randomly selected, within clusters representing target areas of of ACT distribution (e.g. a certain number of districts from each Province if the distribution of the UNITAID supply occurred via the Provincial Medical Stores).

Since reliable data were not available at central/provincial or even district levels, a health facility survey was implemented in both countries selecting in each of the 12 chosen districts: one district hospital, and three-four rural health centers. The rural health centers provided data on the indicators 1) and 2), while the district hospital provided data on the indicator 3), listed above:

RESULTS OF THE SURVEY

Part I - Burundi

a. ACT delivered, distribution and future procurement plans

A total of 722,953 treatment courses of artesunate + amodiaquine blister packs, manufactured by CIPLA Ltd (India) - date of manufacturing: 07/2007 and expiry date: 06/2009, were delivered by UNICEF to Bujumbura on 22 and 23 August 2007. As planned, the medicines have been immediately transferred in the stores of CAMEBU (Centrale d'Achat des Médicaments du Burundi), and integrated in the national system for ACT distribution to all the Provinces (Bureaux Provinciales de la Santé) of the country.

Burundi was granted on an exceptional basis an extension of funding for ACT procurement by GFATM to cover the needs for 2007 and 2008, after the termination of the Round 2 grant. A total of 1'328'100 treatment courses of ACTs (artesunate + amodiaquine blister packs, manufactured by IPCA Ltd, India) were procured in 2007. According to the principles of good drug supply management "first in first out, first

expired first out", the distribution of medicines delivered by UNITAID was postponed after the distribution of new stocks provided by GFATM.

The delivery of ACTs provided by UNITAID started on 2 November 2007, and, as of 17 March 2008, 444'300 (61.4% of the donation) has been distributed. The remaining stock will be distributed during the next months, before the new GFATM orders of 1'612'775 treatment courses of ACTs (artesunate + amodiaquine blister packs, manufactured by Guilin Pharmaceutical Co., China) will be delivered in 2008.

The distribution of ACTs donated by UNITAID to Burundi has been entirely integrated in the national distribution system for essential medicines. The Central Medical Store (CAMEBU) actively distributes the medicines (by "push system") to the Medical Store of the Provinces (Bureaux Provinciales de la Santé), from where the health services of the districts (Secteurs de Santé) take their stocks on a regular basis ("pull system"). All ACTs are provided to patients through the public sector at highly subsidized prices, i.e. 100 FBU for children under 5 and 200 FBU for adults (same user fee applied for chloroquine in the past). For other antimalarial medicines, e.g. quinine tablets and ampoules, a cost-recovery system is applied.

It is expected that during the second half of 2008, the GFATM will start disbursement of the Rolling Continuation Channel (RCC) which was approved for Burundi in 2007, including ACT procurement for the upcoming 6 years.

b. *Specificity of the survey implemented in Burundi*

The 12 Provinces receiving the cumulative 86.4% of the ACTs supplied by UNITAID were selected for the survey: within each province one district (Secteur de Santé) was randomly selected. Within each district the survey focussed on the district hospital and three randomly selected rural health centers, providing a the total sample size of 12 district hospitals and 36 rural health centers.

The survey was carried out by 4 mobile survey teams, made of three survey members and one supervisor. Each team was provided with one vehicle and was responsible to conduct the full survey in three districts. At each district, one supervisor from the district staff was also added to the team to facilitate the activity. The study coordinator, also with one vehicle, supervised all four team during the survey. The study coordinator, team supervisors, the statistician and the survey personnel were all briefed by WHO staff before the launch of the survey during the week of 24 March 2008.

c. *Results of the survey for each of the respective indicators*

The proportion of health facilities, covered by survey in the respective districts, with no stock-outs of ACTs is presented in the Table 1 below. Data refer to randomly selected rural health facilities dispensing ACTs (3 per district), comparing the data of the second semester (3rd and 4th quarters combined) of 2007 with the historical controls, i.e. data of the same quarters (Q3 and Q4) for 2005 and 2006.

District	2nd Sem 2005		2nd Sem 2006		2nd Sem 2007		Statist
	n/T	(%)	n/T	(%)	n/T	(%)	P
Muramvya	2/3	(66.6)	2/3	(66.6)	2/3	(66.6)	
Cibitoke	3/3	(100)	2/3	(66.6)	3/3	(100)	
Karusi	1/3	(33.3)	1/3	(33.3)	1/3	(33.3)	
Bururi	3/3	(100)	2/3	(66.6)	2/3	(66.6)	
Rutana	3/3	(100)	1/3	(33.3)	3/3	(100)	
Makamba	3/3	(100)	3/3	(100)	3/3	(100)	
Kirundo	3/3	(100)	3/3	(100)	3/3	(100)	
Ngozi	3/3	(100)	3/3	(100)	2/3	(66.6)	
Kayanza	2/3	(66.6)	0/3	(0)	1/3	(33.3)	
Gitega	2/3	(66.6)	3/3	(100)	3/3	(100)	
Ruyigi	3/3	(100)	2/3	(66.6)	3/3	(100)	
Cankuzo	1/3	(33.3)	1/3	(33.3)	0/3	(0)	
TOTAL	**29/36**	**(80.6)**	**23/36**	**(63.9)**	**26/36**	**(72.2)**	**P=0.287**

(Where n = number of health centers investigated and found without ACT stock-outs, and T = total number of health centers with records of ACT stocks investigated)

The proportion of malaria patients treated with ACTs in the selected 12 districts is presented in the Table 2 below, derived from the analysis of randomly selected rural health centers dispensing ACTs (3 per district), comparing the data of the 2nd semester of 2007, with historical data of the same periods (2nd semesters) in 2005 and 2006.

District	2nd Sem 2005		2nd Sem 2006		2nd Sem 2007	
	a/M	(%)	a/M	(%)	a/M	(%)
Muramvya	3492/8057	(43.3)	1784/3682	(48.5)	868/2846	(30.5)
Cibitoke	9115/9422	(96.7)	7711/8358	(92.3)	6629/8788	(75.4)
Karusi	0/22247	(0)	0/12745	(0)	0/8208	(0)
Bururi	0/1080	(0)	0/889	(0)	0/598	(0)
Rutana	1121/5073	(22.1)	1210/3462	(35)	686/1815	(37.8)
Makamba	0/8387	(0)	1420/7693	(18.5)	3370/5839	(57.7)
Kirundo	7400/5700		13729/13999	(98.1)	9971/10165	(98.1)
Ngozi	76977717	(99.7)	4765/4795	(99.4)	6180/5389	
Kayanza	13230/13307	(99.4)	6879/6885	(99.9)	5078/5018	
Gitega	1455/10490	(13.9)	7551/6705		5604/5927	(94.6)
Ruyigi	0/9100	(0)	3221/4399	(73.2)	3578/4408	(81.2)
Cankuzo	2594/9427	(27.5)	7696/10338	(74.4)	3021/7368	(41)
TOTAL	**38704/104307**	**(37.1)**	**48415/77245**	**(62.7)**	**33727/55962**	**(60.3)**

(Where a = number of patients treated with ACTs in the health centers covered by the survey, and M = total number of patients treated for suspected or confirmed malaria in health centers surveyed) - The data in red and without proportion calculated require further verification, and have not been included in the totals.

The malaria in-patient case fatality rate from the 12 district hospitals selected for the survey are presented in the Table 3 below, comparing the data of the 2nd semester of 2007, with historical data for the same periods (2nd semesters) in 2005 and 2006.

District	2nd Sem 2005		2nd Sem 2006		2nd Sem 2007		Statist
	d/M	(%)	d/M	(%)	d/M	(%)	P
Muramvya	10/746	(1.3)	12/425	(2.8)	9/260	(3.5)	
Cibitoke	69/1486	(4.6)	30/1193	(2.5)	35/1089	(3.2)	
Karusi	0/0		21/398	(5.3)	23/353	(6.5)	
Bururi	0/388	(0)	4/393	(1)	3/258	(1.2)	
Rutana	17/614	(2.8)	31/325	(9.5)	27/295	(9.2)	
Makamba	60/2233	(2.7)	21/683	(3.1)	25/1086	(2.3)	
Kirundo	4/160	(2.5)	32/889	(3.6)	26/733	(3.5)	
Ngozi	112/1576	(7.1)	28/268	(10.4)	28/837	(3.3)	
Kayanza	0/0		0/0		9/238	(3.8)	
Gitega	16/259	(6.2)	6/17	(35.3)	8/40	(20)	
Ruyigi	-	-	-	-	-	-	
Cankuzo	10/416	(2.4)	3/257	(1.2)	6/251	(2.4)	
TOTAL	**298/7878**	**(3.8)**	**188/4848**	**(3.9)**	**199/5440**	**(3.7)**	**P=0.797**

(Where d = number of deaths attributed to malaria in the district hospitals covered by the survey, and M = total number of patients admitted for malaria in the hospitals covered by the survey)

Part II - Liberia

a. ACT delivered, distribution and future procurement plans

According to the UNICEF report, a total of 678,875 ACT-treatments supplied by UNITAID were delivered to the National Malaria Control Program of the Ministry of Health and Social Welfare, which coordinates malaria control activities nationwide. The medicines were stored at the National Drug Service (NDS) warehouse for further distribution to the 9 regional depots and finally transported to the 365 public and private health facilities in the 15 counties. The records of the physical count of the ACTs received under this consignment indicated a shortage of 600 doses of the adult preparation (in disagreement with the UNICEF report), i.e. 298,100 adult treatment courses instead of 298,700. The total amount of medicines received was 678,275 treatment courses.

NDS was responsible with the distribution of medicines, following the same process implemented for the distribution of medicines provided with the GFATM grant. Each health unit quantifies their quarterly requirements and submits the requirements to the county malaria focal point. The quarterly requirements of ACTs are calculated on the basis of the double of the amount of medicine consumed in the previous quarter (a), minus the balance from last supply that is still in the store (b). The exact calculation of ACT requirements for the next quarter (c) is given by the formula: $2a - b = c$.

The requests for ACTs are then sent to NMCP for verification and approval. After clearance, NMCP sends the requests to NDS for packing and shipment to the county depots in the amounts requested by each health unit. These packs are then sent to the nine depots together with fuel requirements for the transport to the respective health units on a quarterly or every two-monthly basis. In general, the health facilities supported

by NGOs, are facilitated in transporting these medicines compared to government health facilities.

The major challenges in the drug distribution system is in the transport from the depot to the health facilities and in ensuring regular orders from all health units to avoid stock-outs. At the time of survey, the NDS had only about 3 months supply of ACTs which were delivered by the emergency fund of US-PMI (unfortunately delivered without funds to cover distribution costs, affecting their rapid mobilization). In addition, according to the national treatment policy, the ACTs should only be prescribed after parasitological confirmation of malaria diagnosis: for this reason, each consignment of ACTs should be matched by a procurement of RDTs to support parasitological diagnosis. Ideally, each funding agency supporting ACT procurement should supply RDTs for malaria diagnosis, on average as much as twice the amount of ACT doses (this is not always complied with).

b. _Specificity of the survey implemented in Liberia_

The Liberian health system is divided into 5 regions, and each region has about three counties which correspond to the health districts. Each county is divided in 5-6 administrative districts. For the survey the counties have been selected as the basis for the sampling scheme. In view of the limited time available for the survey only nine health districts (counties) with ease of access were selected. In each health district the survey included the district hospital, one health centre and two clinics. The health centre and clinics to be visited within each health district were randomly selected.

In each health service unit, records were reviewed for the years 2005, 2006 and 2007, selecting as "UNTAID intervention period" the 3rd and 4th quarter of 2007 (time of delivery of UNITAID sponsored medicines to Liberia), and the same time quarters (Q3 and Q4) for 2005 and 2006 served as historical controls. The three survey indicators were collected from the same nine health districts.

Because of the lack of reliable data at central level, four teams were formed to carry out a health facility survey, with standard methodology and data collection tools. The study coordinator, team supervisors, the statistician and the survey personnel were all briefed by WHO staff before the start of the survey during the week of 18 March 2008. The first day of the survey was devoted to in-depth interviews of the health personnel and to prepare for the health facility survey. The subsequent 2.5 days were employed for data collection, and the rest of the week was used for data collation, analysis and report writing.

In total 31 health facilities were covered by the survey in Liberia: 8 district hospitals, 6 health centers and 17 clinics.

c. _Results of the survey for each of the respective indicators_

The proportion of health facilities, covered by survey in the 9 selected districts, with no stock-outs of ACTs is presented in the Table 4 below. Data refer to randomly selected rural health facilities dispensing ACTs (3-4 per district, excluding few health

facilities because of missing data), comparing the data of the second semester (3rd and 4th quarters combined) of 2007 with the historical controls, i.e. data of the same periods (2nd semesters) in 2005 and 2006.

District	2nd Sem 2005		2nd Sem 2006		2nd Sem 2007		Statist
(County)	n/T	(%)	n/T	(%)	n/T	(%)	P
River Cess	1/4	(25)	0/4	(0)	0/4	(0)	
Grand Bassa	1/3	(33.3)	3/3	(100)	3/3	(100)	
Gbarpolu	3/3	(100)	3/3	(100)	3/3	(100)	
Cape Mount	0/3	(0)	3/3	(100)	3/3	(100)	
Bomi	3/3	(100)	1/3	(33.3)	3/3	(100)	
Bong	2/2	(100)	2/2	(100)	1/2	(50)	
Nimba	2/2	(100)	½	(50)	1/2	(33.3)	
Margibi	2/2	(100)	½	(50)	2/2	(100)	
Montserkado	2/2	(100)	½	(50)	½	(25)	
TOTAL	**16/24**	**(66.6)**	**15/24**	**(62.5)**	**17/24**	**(70.8)**	**P=0.829**

 (Where n = number of health centers investigated and found withour ACT stock-out, and T = total number of health centers with records of ACT stocks investigated)

The proportion of malaria patients treated with ACTs in the selected 9 districts is presented in the Table 5 below, derived from the analysis of randomly selected rural health centers dispensing ACTs (3-4 per district), comparing the data of the 2nd semester of 2007, with historical data of the same periods (2nd semesters) in 2005 and 2006.

District	2nd Sem 2005		2nd Sem 2006		2nd Sem 2007	
	a/M	(%)	a/M	(%)	a/M	(%)
River Cess	1200/2606	(46.1)	3515/5260	(66.8)	4358/4951	(88.0)
Grand Bassa	1516/3021	(50.2)	1520/3284	(46.3)	6547/4951	
Gbarpolu	798/1410	(56.6)	1604/8675	(18.5)	2168/4727	(45.9)
Cape Mount	241/685	(35.2)	464/652	(71.1)	1019/1789	(57.0)
Bomi	NA		2190/9021	(24.3)	2845/3938	(72.2)
Bong	3181/1989		9736/11432	(85.2)	6082/8668	(70.2)
Nimba	NA		4229/2733		4735/2586	
Marjibi	553/2089	(26.5)	523/1497	(34.9)	1366/4340	(31.5)
Montserkado	2927/8781	(33.3)	6270/11899	(52.6)	8559/16151	(53.0)
TOTAL	**7235/18592**	**(38.9)**	**25822/51720**	**(49.9)**	**26397/44564**	**(59.1)**

(Where a = number of patients treated with ACTs in the health centers covered by the survey, and M = total number of patients treated for suspected or confirmed malaria in health centers surveyed) - - The data in red and without proportion calculated require further verification, and have not been included in the totals.

The malaria in-patient case fatality rate from the 9 district hospitals selected for the survey are presented in the Table 6 below, comparing the data of the 2nd semester of 2007, with historical data for the same periods (2nd semesters) in 2005 and 2006.

District	2nd Sem 2005		2nd Sem 2006		2nd Sem 2007		Statist
	d/M	(%)	d/M	(%)	d/M	(%)	P
River Cess (St FrançisHospital)	2/50	(4.0)	2/51	(3.9)	3/36	(8.3)	
Grand Bassa (Gov. Hosp. Buchana)	28/426	(6.6)	27/430	(6.3)	33/305	(10.8)	
Gbarpolu (Bopolu Health Center)	0/16	(0)	0/17	(0)	0/38	(0)	
Cape Mount (St Tomothy Hospital)	NA		NA		7/206	(3.4)	
Bomi (Government Hospital)	NA		26/784	(3.3)	2/183	(1.1)	
Bong (Phoebe Hospital)	37/624	(5.9)	43/796	(5.4)	29/753	(3.8)	
Nimba (G.W. Harley Hospital)	19/183	(10.4)	12/175	(6.8)	5/140	(3.6)	
Marjibi (C.H.O. Rennie)	10/1111	(0.9)	3/2145	(0.1)	15/1990	(0.7)	
Montserkado (Redemption Hospital)	36/1745	(2.1)	2/1165	(0.2)	0/846	(0)	
TOTAL	**132/4155**	**(3.2)**	**115/5563**	**(2.1)**	**94/4497**	**(2.1)**	**P=0.9[1]**

(Where d = number of deaths attributed to malaria in the district hospitals covered by the survey, and M = total number of patients admitted for malaria in the hospitals covered by the survey)

CONCLUSIONS AND RECOMMENDATIONS

- The health facility survey in both countries has confirmed the "success" of the UNITAID project in ensuring uninterrupted supply of ACTs, documented by the stability of the selected indicators (proportion of health facilities without ACT stock-outs, proportion of patients treated with ACTs, and inpatient malaria case fatality rate).

- The surveys in both countries have also documented specific problems in the drug distribution system at peripheral levels (beyond the Central and Provincial-/County levels): in order to maximize impact of UNITAID ACT delivery projects, investment should be made in the medicine supply management systems of the recipient countries.

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[1] Comparing 2007 with 2006 malaria inpatient case fatality rate

Definition of indicators

For the 12 selected districts, during the period 2005-2007, on monthly or quarterly basis:

1. proportion of health units with no "stock out" of ACT

No. of health facilities surveyed with no ACT stock-outs during the month   x 100
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No. of health facilities dispensing ACTs surveyed during the same month

Note: ACT stock out is defined as to absence of all 3 ACT presentations (for children, adolescents and adults, respectively

2. proportion of patients treated with ACT

No. of patients treated with ACT in outpatient departments of health facilities x 100
_____

No. of malaria patients reported by surveyed health facilities dispensing ACTs

Note: in case reports are not available the following surrogate indicator can be used:

No. ACT treatment courses dispended by surveyed health facilities   x 100
_____

No. of malaria patients reported by surveyed health facilities dispensing ACTs

3. malaria case fatality rate in hospitals and health centers with admission facilities

No. of deaths attributed to malaria among admitted patients   x 100
_____

Total No. of admissions reported as malaria in the same facilities