Malaria Policy Advisory Committee Meeting

16–18 September 2015, Geneva, Switzerland
Background document for Session 1

Review of delivery cost data on mass drug administration for malaria

August 2015

A review of published and unpublished experiences of implementing mass drug administration (MDA) for malaria was conducted, to collect information on implementation cost and to estimate the unit delivery cost. The methodology is described in Annex 1. The review focused on the costs of delivering MDA; those costs include personnel, transportation, social mobilization, supplies, and so on, but exclude the cost of antimalarial drugs.

Cost data were collected for three experiences of using MDA for malaria, all using door-to-door MDA delivery. Two were implemented in island settings (Comoros and Vanuatu) and one in an emergency scenario (Sierra Leone). The experience in Vanuatu is described in a peer-reviewed publication (1), which also provides some delivery cost information. The other two experiences are described in reports (2-4), with cost data provided through personal communications by the implementing agencies to GMP in June to July 2015. Cost estimates are presented here in 2015 United States (US) dollars.

Cost data were available on:

- drugs, personnel, transportation, supplies, equipment and utilities in Comoros;
- drugs, local transportation and travel allowances, medical supplies and bednets in Vanuatu; and
- drugs, other medical supplies, non-medical supplies, personnel, transport, utilities and other recurrent costs in Sierra Leone.

Targeted populations in these experiences ranged between about 720 people in Vanuatu, 680 000 in Comoros and 3.05 million in Sierra Leone.

The antimalarial drug cost, including international shipment cost, was estimated at $ 2.33 per person-round using Artequick and primaquine in Comoros; at $ 1.23 for all nine weekly combinations of primaquine, chloroquine and sulfadoxine-pyrimethamine (SP) ($0.14 per administration) in Vanuatu; and at $ 1.00 using artesunate-amodiaquine (ASAQ) in Sierra Leone.

The delivery cost per covered person-round varied greatly across the three experiences: $ 11.05 in Comoros, $ 4.73 for all nine weekly administrations ($ 0.53 per administration) in Vanuatu and $ 0.36 in Sierra Leone. Figs. 1, 2 and 3 show the cost breakdown for each programme.

One would expect a lower unit cost with a greater number of people targeted because of economies of scale. Evidence on the delivery cost of MDA for neglected tropical diseases (NTDs) suggests a delivery unit cost lower than US$ 0.50 in most countries for interventions covering 100 000 people or more (5). A mean cost of less than $ 0.50 per person treated, excluding drug cost, was also reported on MDA for lymphatic filariasis and onchocerciasis in sub-Saharan Africa (6).

WHO/HTM/GMP/MPAC/2015.10

In Comoros, the high unit delivery cost relative to the programme scale might reflect personnel cost (32%), which included both international and local resources (per diems for international officials, expert consultancy cost and local training per diems). There was not enough information to dissociate international versus local personnel costs. It is, however, likely that excluding international related costs would lower the unit delivery cost. Similarly, transportation cost (20%) included both internationally and local transport costs (Figure 1). By removing the international transport component, the unit cost per person-round in Comoros would drop down below $ 9.50. Finally, in Comoros, supply costs (29%) (Figure 1), included the costs of social mobilisation and promotion and office supplies. It is likely that the costs of social mobilization and promotion represented most of those supply costs.

In Vanuatu, the delivery cost per person covered by 9 weeks of MDA was estimated at $ 4.73, equivalent to $ 0.53 per weekly administration. It included the costs of transportation and travel allowance (85%) and equipment and supplies costs (15%) (Fig. 2). There was not enough information available to estimate the cost of local versus international transportation and the share of other resource costs, such as personnel (Fig. 2).

In Sierra Leone, MDA was implemented in eight districts during the Ebola outbreak. The average delivery cost per person-round was estimated at $ 0.36, ranging between $ 0.29 and $ 0.39 across districts. In the two districts supported by Médecins Sans Frontières (MSF) Spain, the average delivery cost per person-round was estimated at $ 0.39. In the six districts supported by the national malaria control programme (NMCP) and the United Nations Children's Fund (UNICEF), unit costs ranged from $ 0.29 to $ 0.38. Differences in unit delivery cost across districts are mainly driven by the targeted population size (i.e. generally lower delivery unit cost with larger targeted population size) and the share of central level coordination cost allocated to each district by targeted population size (i.e. higher coordination cost share allocated to districts with larger targeted population size). In the two districts supported by MSF, personnel cost accounted for 50% of the unit delivery cost, central level coordination for 21%, local transport for 15%, utilities for 6% and supplies and equipment for 4% each (Fig. 3).

There are several limitations to the delivery cost estimates for MDA malaria presented here. First, we identified cost information for three MDA experiences only, and found huge cost variations across these experiences, which seriously limit the potential for comparison or generalization across settings. Second, cost information, where available, was often lacking in. Cost data were provided as totals for large categories of resources, such as personnel, transport, supplies and so on. It was therefore generally challenging, or not possible, to distinguish between the costs of:

- start-up or planning phase versus roll-out phase;
- local and international resources;
- central versus district level resources; and
- recurrent versus capital or fixed costs.

Furthermore, there were uncertainties about the cost of antimalarial drugs, which would affect the estimation of MDA unit delivery cost. Third, the limited data available related to financial costs only. No information was available for estimating economic costs that would capture the value of all resources, irrespective of whether these involved an additional direct cost. For example, where available, personnel cost data included the financial cost of per diems but excluded salary cost data, which would be necessary for placing a value on the time spent by personnel on MDA, and to inform policy makers on the true amount of resources required. Similarly, information on the cost of using vehicles or storage facilities that existed prior the MDA implementation was often lacking. Fourth, there was no information on the cost of research that may have been conducted during the implementation (e.g. to assess compliance rates) so it was not possible to exclude those costs from the MDA unit delivery cost. Further

research on the cost of implementing MDA for malaria is required, particularly research using ingredient-based costing approaches, where possible.

Figure 1: MDA delivery cost breakdown in Comoros

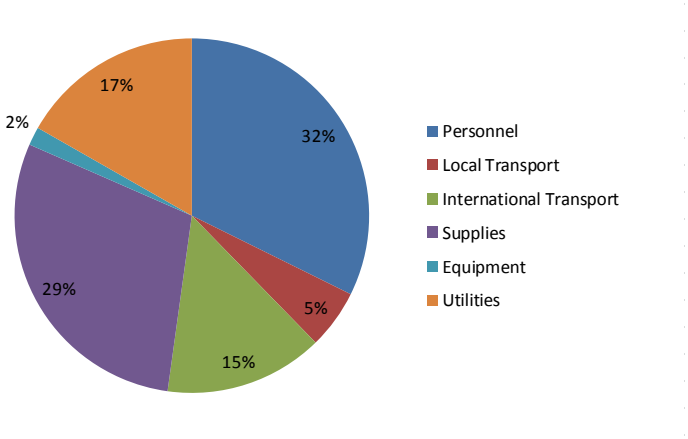

Figure 2: MDA delivery cost breakdown in Vanuatu

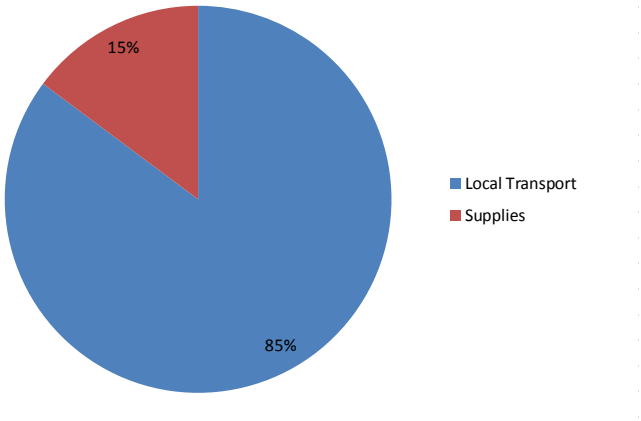

Figure 3: MDA delivery cost breakdown in Sierra Leone (Western areas)

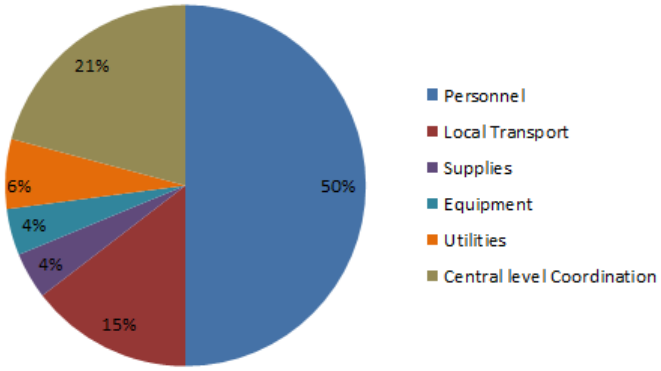

Table 1 Available evidence on the cost of MDA for malaria (costs in 2015 US$)

Context (year)	District or country	Drug	No of rounds (a)	No of people targeted per round (b)	Coverage rate (c)	No of people covered per round (d)= (b)×(c)	Total cost per round (e)	Total cost per targeted person-round (f)=(e)/(b)	Total cost per covered person-round (g)=(e)/(d)	Delivery cost per targeted person-round[a]	Delivery cost per covered person – round[a]
Island (2007/14)	Comoros	Artequick, PQ	2[b]	679,018	75.5%[c]	515,109	$ 7.28 million	$ 10.72[d]	$ 14.13	$ 8.38	$ 11.05[e]
Island (1991)	Vanuatu, Aneityum island	PQ,CQ, SP	9	718	100%	718	n/a	$ 5.95[f]	$ 5.95[f]	$ 4.73	$ 4.73
Emergency (2014/15)	Sierra Leone, 8 districts	ASAQ	2	3,043,438[g]	92%[h]	2,806,810	$ 3.32 million	$ 1.22 [i]	$ 1.31	$ 0.32	$ 0.36[j] (min $ 0.29– max $ 0.39)

ASAQ, artesunate-amodiaquine; CQ, choloroquine; n/a, data not available; PQ, primaquine; SP, sulfadoxine-pyrimethamine

[a] Obtained by deducting drug cost to the total cost, and by dividing by number of people targeted or covered

[b] Three locations (Moheli, Anjouan and Grand Comoro), of which two (Anjouan and Grand Comoro) had two rounds and one had three rounds. We used two rounds for the cost calculations because 95% of the population targeted received two rounds (2).

[c] This is an average of the coverage achieved among the 95% population targeted at round one of two locations (2).

[d] Cost of treatment in Comoros using Artequick was estimated at $ 2.33, based on data provided by the implementer.

[e] Unit delivery cost was estimated at $ 9.45 per person-round when excluding international personnel transportation costs

[f] Kaneko et al report a total cost per person at $ 9.00, including $ 5.60 for bednets, $ 0.70 for antimalarials, $ 0.40 for materials and diagnosis and $ 2.30 for transportation and personnel (1). Published cost figures were assumed to be in $ 1991 and were converted to $ 2015 equivalent. We estimated the total cost per person at $ 5.95, with a delivery cost (excluding drugs) of $ 4.73 per person. It was assumed that the 9 weekly administrations corresponded roughly to one round.

[g] Sum of district-level data on targeted populations (4).

[h] Average of district level coverage rates (4), except for western areas, for which coverage rates reported by MSF Spain were used (3).

[i] Cost data reported by MSF Spain combined with cost data reported by NMCP (personal communications, July 2015) were used. It was assumed that the drug cost reported by MSF Spain represented the drug cost for the two districts (western area) supported by MSF Spain, and that the drug cost reported by the NMCP represented the drug cost for the six districts supported by NMCP/UNICEF (i.e. that there was no overlap between the organisations' drug expenditures). It was also assumed that the cost of central coordination reported by the NMCP was shared across all eight districts, by apportioning the total cost of central coordination to each district using the share of the total number of people targeted in each district.

[j] Weighted average cost per person covered per round across all eight districts.

Annex 1

A Pubmed search was conducted in July 2015 using a set of key terms, with publications restricted to those written in English or French, and published between 01 January 1950 and 01 July 2015. A total of 161 references were retrieved. The key terms used were:

(mass drug administration malaria OR chemoprevention malaria OR intermittent preventive treatment malaria OR mass screening and treatment malaria OR focal screening and treatment malaria) AND (economics OR costing OR costs OR financial OR economic OR funding OR funds OR cost OR resources OR price OR prices).

Whilst the initial search strategy aimed to identify cost information from MDA as well as other interventions like chemoprevention, intermittent preventive treatment and focal screening and treatment for malaria, cost information from MDA programmes only were reviewed for the purpose of this background document.

Key informants working in organisations involved in implementing MDA for malaria were contacted in June 2015; those contacted are listed in Table A1.

Table A1 List of key informants contacted

Country of implementation	Organisation or person contacted
Cambodia, Comoros	MOH/Guangzhou University of Chinese Medicine
Republic of Tanzania (Zanzibar)	IHI, S. Abdullah
Sierra Leone	MSF and NMCP/UNICEF
Vanuatu	A. Kaneko

IHI, Ifakara Health Institute; MOH, ministry of Health; MSF, Médecins Sans Frontières; NMCP, national malaria control programme; UNICEF, United Nations Children's Fund

References

1 Kaneko A, Taleo G, Kalkoa M, Yamar S, Kobayakawa T, Bjorkman A. Maalria eradictaion on islands. The Lancet. 2000;356.

2 WHO. WHO Evidence Review Group MDA, MSAT & FSAT for Malaria: Meeting Report. Geneva, 2015.

3 MSF. Conducting a mass drug administration: The MSF experience in the Western Area division of Sierra Leone in 2014/15. Médecins Sans Frontières Spain. 2015.

4 NMCP. Preliminary results for the second Mass drug Adminstration in response to the Ebola outbreak. Ministry of Health of the Government of Sierra Leone. 2015.

5 Fitzpatrick C, Madin-Warburton M, Schneider T. Benchmark for the cost per person of mass treatment against neglected tropical diseases: a literature review and meta-regression with web-based software application. submitted.

6 Keating J, Yukich J, Mollenkopf S, Tediosi F. Lymphatic filariasis and onchocerciasis prevention, treatment and control costs across diverse settings: a systematic review. Acta Tropica. 2014;135.