Cost of Mass Drug Administration for Filariasis Elimination in the province of Sorsogon, Philippines

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ABSTRACT

Objective. Elimination efforts for lymphatic filariasis are underway in the Philippines using mass drug administration (MDA) of diethylcarbamazine and albendazole as one of the main strategies. This cost analysis was done to determine the MDA implementation cost and provide useful information to the control programme on how to best utilize limited resources.

Methods. This cost analysis study was conducted in the province of Sorsogon, Philippines in 2004. The study was done from a program perspective. Cost data for 2003 was obtained retrospectively via key informant interviews and records review using a standardized guide from a multi-country cost analysis study of filariasis elimination programs. Cost figures were classified as either economic or financial costs and expressed in real terms using 2002 as base year. Sensitivity analysis was likewise performed.

Results. The total economic cost and cost per person treated with MDA were estimated at US$223,549.55 (Php12,116,385.48) and US$0.40, respectively. The financial costs were less than half of the economic costs. The main cost driver was drug distribution. The highest economic and financial costs were incurred at the national (54.5%) and municipal (74.4%) levels, respectively. High variation in costs of MDA activities was observed.

Conclusion. This cost analysis provides reasonable estimates which may be used to assist government and other stakeholders in program planning and resource generation for filariasis elimination programs in endemic areas.

Keywords: cost analysis, lymphatic filariasis, mass drug administration, diethylcarbamazine, albendazole

Introduction

There are more than 120 million people infected with lymphatic filariasis (LF) in 83 countries worldwide.[1] One of the two main strategies for the elimination of this disease is mass drug administration (MDA).

In the Philippines, the microfilaremia rate ranges from 0.05% to 29.2%[2] due to endemic bancroftian filariasis. The National Filariasis Elimination Program, as part of the Disease Free Zone Initiative, intends to reduce public health threats posed by filariasis.[3] MDA uses a combination of age-wise dosing of diethylcarbamazine citrate (DEC) and 400 mg albendazole tablets among individuals two years old and above in endemic areas for four to five consecutive years. A target coverage rate of at least 85% for every MDA round is set. Elimination efforts in the country began in 2001 with municipalities and cities being declared as implementation units (IUs). In 2002, overall MDA coverage in endemic municipalities from 24 provinces was 74%. MDA was scaled up through the years based on the budget allotted to the program, with 38 provinces being covered in 2007.[4] The efforts on filariasis elimination are expected to require substantial resources that need to be sustained over a four to five year period. In order to eliminate filariasis by 2015[5], it is necessary to determine the costs of implementing the MDA strategy and generate estimates for required investments by various stakeholders.

The Department of Health (DOH) through the World Health Organization purchases DEC tablets, while albendazole tablets are donated by GlaxoSmithKline (GSK). MDA in endemic provinces are carried out either by fixed site administration or house-to-house approach. In fixed site administration, MDA is conducted in a single area such as gymnasium, school or health center where the community gathers to receive and take the anti-filarial drugs. On the other hand, the house-to-house approach involves health workers visiting households to administer treatment. The Filariasis Elimination Volunteers or *barangay*[a] health workers deliver the drugs to the target population through both approaches.

Administration of the elimination program involved planning on key program activities, coordination with all implementers, and reporting of results and accomplishments to appropriate authorities. The key program activities include administration, mapping of endemic municipality or city, training and orientation of health workers, social mobilization, drug distribution, adverse drug reaction monitoring and surveillance. Figure I show the elimination program implementation scheme at all levels (national, regional, provincial and municipal).

Data about the LF elimination program in the Philippines, its structure, processes, performance, and the economic and financial costs incurred for these would be useful in determining how to best utilize limited resources for LF elimination especially in low-resource settings. In addition, this would be valuable in the planning, budgeting, resource generation, evaluation and modification of programs based on changing needs and conditions.

A multi-country study by Goldman et al. in 2007[6] reported the results of cost analysis in terms of total annual costs for

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[a]barangay is the smallest political unit in the country

carrying out the LF elimination program in an endemic area, the average cost per person treated, the relative contributions of various partners and the reasons for variation in costs and resources across several countries, including the Philippines. This study aims to provide a more detailed description of the country-specific LF elimination activities and its associated economic and financial costs. It also aims to estimate the program requirements to undertake a Disease Free Zone Initiative in an endemic area. Results from this study can guide estimation of local and national program resource requirements, the identification of critical investment items and potential sources of funding.

Methods

Perspective

This is a cost analysis study undertaken from a program perspective. The study was conducted in 2004, after delivery of three rounds of mass treatment. Cost data was obtained retrospectively via key informant interviews and records review using a standardized guide from a multi-country cost analysis study of filariasis elimination programs.

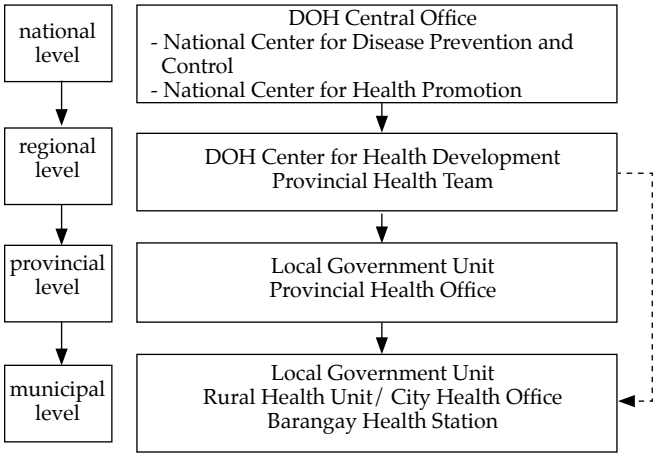

Figure 1. Scheme of National Filariasis Elimination Program Implementation

Study site

The province of Sorsogon was chosen as the study site being one of the first areas that implemented MDA in the country in 2001. The province has 14 municipalities, one city and a total of 541 *barangays*. As of May 2000, Sorsogon's population was 650,535 with an average household size of five.[7] All areas in the province were endemic for Bancroftian filariasis, transmitted mainly by *Aedes* spp. mosquitoes that breed in abaca and banana axils.[8]

The IUs (municipalities and city) were grouped based on filariasis endemicity (microfilaremia rates), accessibility and population size. A total of eight sampled IUs were randomly selected from the different groupings namely Casiguran, Donsol, Gubat, Irosin, Juban, Magallanes, Prieto Diaz, and Sorsogon City. From these IUs, a total of 25 *barangays* were chosen, of which the number of sampled *barangays* per IU was made proportional to the total number of *barangays* per IU. Of the sample of barangays per IU, a sentinel *barangay* was selected based on high microfilaremia rates. One to three *barangays* adjacent to the sentinel *barangay* were likewise studied.

Records were reviewed and key informant interviews were conducted in all MDA levels of implementation. Data sources at each level of implementation as well as detailed costing methods are described in detail in a separate report.[9] These sources were in the form of annual reports, accounting balance sheets, financial reports, budgets and payrolls. Terms used in the cost analysis are defined in another reference material.[10]

Costing Methods

The costs of the third year of the MDA implementation (2003) were used in this cost analysis. The costs were valued in Philippine pesos (Php) and were converted to US dollars (US$), using the average exchange rate for 2003, which was Php54.20 to US$1.00.[11] Costs of all MDA key activities in endemic areas were identified and valued at various levels of implementation. The activities in MDA over a five-year period are essentially the same each year, except for the mapping activities, which are done early in program implementation. Thus mapping costs for 2001 was determined by deflating the mapping cost in 2003 cumulatively using the actual inflation rates in 2002 and 2003.

Costs were also categorized either as capital or recurrent costs to differentiate which ones would be one time investments and which will be spent for repeatedly throughout project implementation. Costs were also reported as financial or economic costs to differentiate those that will involve actual cash transfers to those that are donated like drugs or volunteer time.

During data gathering, not all costs can be fully accounted for with official records; hence, formal costing procedures were substituted with the use of proxies such as rental costs and public transport fares. Some interchangeability between costs and charges became necessary in this aspect.

The following costing methodologies were applied to derive the cost of input from available data. The cost of personnel time was calculated by multiplying the percent of time spent for MDA activities with the annual pay corresponding to designated salary grade levels per type of staff. The percent of time spent for MDA was calculated by dividing the time in days spent working on MDA related activities by the total number of working days per year. To estimate personnel costs of filariasis elimination volunteers, the average allowance provided to volunteer health workers as proxy for the market value of volunteer time was utilized. Since these volunteers were not formally compensated, the average allowance was treated as the amount that was sufficient to entice them to join the health workforce. In drug distribution, the economic cost of albendazole was based on the declared acquisition cost from GSK. This amount excluded distribution, transport and warehousing cost. The average cost of supplies was determined from available data in the sampled *barangays*. In estimating the treatment cost of adverse drug reactions, the patients were assumed to receive only one dose of the appropriate drug. Hospitalization costs were included for patients hospitalized due to adverse drug reactions. Transportation costs were estimated using the public transport hire or fare spent during the activities. Costs from using other vehicles (private vehicles, ambulance, trucks) were determined using the estimated cost of fuel consumption.[12] Since actual costs of office spaces in Sorsogon were unavailable, the annual rental charge for an equivalent commercial space was used. Capital investments, such as equipment, were valued in terms of its annual costs computed based on its acquisition cost and a social discount rate of 3%. Mapping activity costs were estimated based on surveillance activities and masterlisting in the municipality.

Since only 8 out of 15 IUs in Sorsogon were included in the study, the overall cost of MDA at the municipal level was estimated by calculating the average cost per person at risk from the available data of the eight sampled IUs. This value was multiplied with the DOH projected population for 2003 for each of the non-sampled IUs to come up with a provincial estimate. This use of DOH projected population estimates was done in accordance with program planning procedures recommended by DOH to local government health units.

The calculation of economic costs considered the cost of donated goods at the different levels of implementation excluding mark ups and other additional costs borne by government that consisted of actual disbursements. Albendazole tablets donated by GSK as well as other donations from non-government organizations, private donors and the community were thus included in the economic costs. All donations were excluded in the calculation of financial costs, which was defined as the amount of actual disbursements from the government.

The total economic and financial cost, the economic and financial cost per person at risk and treated were determined. The study also examined the cost breakdown in terms of activity, input and levels of implementation. Variation of costs was also determined. Input significant in the total costs such as person time and food cost were further studied. Sources of funds for MDA were also identified.

Since the cost estimates obtained in the study were based on a mix of actual and estimated cost of goods and services, sensitivity analysis was performed to provide a range of estimates to accommodate possible movements in costs and to account for possible fluctuations across cost centers over time. Sensitivity analysis was also performed to correct for the variations in MDA implementation. This was done through projection of low, medium and high cost scenarios using average rate of change over time for the main cost driver of a given cost center. The cost implications under these three scenarios were reported in terms of cost per cost center, overall costs and estimated cost per person at risk and treated.

Cost calculations were done using pre-programmed Microsoft Excel spreadsheets prepared by the Emory University, Atlanta, Georgia. STATA 7.0 software[13] was also used in data analysis.

Results

The real total economic and financial cost of MDA incurred for the province of Sorsogon in 2003 was estimated at US$223,549 (Php12,116,385) and US$105,842 (Php5,736,656), respectively as shown in Tables 1 and Table 2. The total costs according to implementers were also presented.

In terms of costs per activity, the cost for drug distribution, social mobilization/ health education activities and administration of the LF program were the highest for both economic and financial costs. The key program activity taking the largest share for both economic and financial costs was drug distribution, accounting for 65.2% and 37.8%, respectively, as shown in Table 3. Surveillance/laboratory activities incurred the least cost, which accounted for only 1.6% of the total economic cost and 3.2% of the total financial cost of MDA.

The main inputs in terms of economic, as shown in Table 4, were the cost for supplies (59.1%) and person-time (35.5%). Person-time proved to be the top input for economic costs of all key program activities, except for drug distribution. Drug supply accounted for 76.9% of the total economic costs for drug distribution. Economic costs for mobilization/education (36.9%), surveillance (33.2%), and training (40.5%) activities were also significantly driven by supplies, but were only second to expenses for person-time. Itemized financial costs are shown in the same table. Person-time topped the list of items (74.7%) followed by supplies used for MDA (17.7%).

In terms of costs classified by level of implementation, expenditures for MDA were highest at the national level, accounting for 54.5% of the total economic costs, as shown in Table 5. However, 85.0% of the said total economic costs at the national level were due to albendazole tablets donated by GSK, while only 5.3% were due to DEC. Similar to the economic cost profile, the provincial level spent the least amount, incurring less than one percent of the financial cost (0.7%). However, it is the municipal/city level that accounted for the largest share of the total MDA financial cost (74.4%).

Table 6 shows the breakdown of economic cost of activities according to implementers. Most economic costs for the key program activities were incurred at the municipal level, except for drug distribution and surveillance. The bulk of drug distribution was accounted for at the national level (76.1%) due to the donated drugs. The costs from surveillance and laboratory were predominantly incurred at the regional level because of high person-time cost of the provincial health team (PHT) (60.1%). Table 7 shows that financial contributions for all elimination program activities, except surveillance, were largely coming from the municipal/city level. The major contribution for surveillance activities came from the regional level (58.9%).

Table 8 shows the varying economic costs in the sampled IUs. The narrowest and widest range of economic costs per person treated was for administration-related activities and drug distribution, respectively. High coefficient of variation for these activities, together with mapping and surveillance was observed. These variations were mainly due to cost of food specifically for training and mobilization, type of personnel involved for mapping, surveillance, drug distribution and administration; and geographic factors (i.e., distance) for drug distribution.

Table 1. Real economic costs per outcome of interest in 2003 (In 2002 Philippine pesos and US dollars)

	National	Regional	Provincial	Total in all the municipalities	TOTAL*
Total Cost per Implementer, Php (US$)	6,601,387.23 (121,796.81)	774,796.98 (14,295.15)	39,736.01 (733.14)	4,700,465.26 (86,724.45)	12,116,385.48 (223,549.55)
Cost/person at Risk, Php (US$)	9.55 (0.18)	1.12 (0.03)	0.06 (0.00)	6.80 (0.12)	17.53 (0.32)
Cost/person Treated, Php (US$)	11.85 (0.22)	1.39 (0.03)	0.07(0.00)	8.44 (0.16)	21.76 (0.40)

*Data on total costs, cost per person at risk and treated have been presented in a study by Goldman *et. al*, 2007 [6]

Most donations for the elimination program were solicited from a private sector (48.4%), which was equivalent to US$106,764.82 worth of albendazole donated by GSK for the province of Sorsogon. The contribution of the DOH-National Center for Disease Prevention and Control and DOH-Center for Health Development combined, amounted to approximately one-fourth of the GSK donation. Total central and local government contributions accounted for 47.7% of

Table 2. Real financial costs per outcome of interest in 2003 (In 2002 Philippine pesos and US dollars)

	National	Regional	Provincial	Total in all the municipalities	TOTAL*
Total Cost per Implementer, Php (US$)	732,208.96 (13,509.39)	696,774.75 (12,855.62)	39,736.01 (733.14)	4,267,936.97 (78,744.22)	5,736,656.71 105,842.37)
Cost/person at Risk, Php (US$)	1,059.09 (0.02)	1.01 (0.02)	0.06 (0.00)	6.17 (0.11)	8.30 (0.15)
Cost/person Treated, Php (US$)	1.31 (0.02)	1.25 (0.02)	0.07 (0.00)	7.66 (0.14)	10.3 (0.19)

*Data on total costs, cost per person at risk and treated have been presented in a study by Goldman *et. al,* 2007 [6]

Table 3. Breakdown of economic and financial costs by key program activity, Sorsogon, Philippines, 2003

Key Program Activity	Economic (%)	Financial (%)
Mapping	5.1	10.0
Training	5.3	9.7
Mobilization	10.2	15.0
Drug Distribution	65.2*	37.8
ADR Monitoring	3.1	6.4
Surveillance	1.6	3.2
Administration	9.4	17.9

*Albendazole 71% and DEC 4% of cost

Table 4. Breakdown of economic and financial costs by inputs, Sorsogon, Philippines, 2003 (in percentage)

Input	Economic (%)	Financial (%)
Person-time	35.5	74.7
Transportation	2.8	2.7
Equipment/facilities	2.6	5.0
Supplies	59.1	17.7

the total MDA implementation costs. The community costs (3.4%) represented the out-of-pocket expenses incurred by the health workers. These costs may be an underestimate of community costs since the study considered a program perspective. Donations from non-government organizations such as Handicap International and Rotary Club of Sorsogon were minimal at 0.6%.

Sensitivity analysis using low, medium and high scenarios are shown in Table 9. The average economic costs ranged from US$207,026, US$240,072 and US$306,165 for the low, medium and high-end projections, respectively. The economic cost per person treated ranged from a low-end estimate of US$0.37 to a medium estimate of US$0.43 and a high-end estimate of US$0.55. On the other hand, the average financial costs ranged from US$102,185, US$120,816 and US$158,079 for the low, medium and high end projections, respectively. The financial cost per person treated ranged from a low-end estimate of US$0.18 to a medium estimate of US$0.22 and a high-end estimate of US$0.28.

Table 5. Breakdown of economic and financial costs by implementer, Sorsogon, Philippines, 2003

Input	Economic (%)	Financial (%)
National	54.5	12.8
Regional	6.4	12.2
Provincial	0.3	0.7
Municipal	38.8	74.4

Discussion

In a multi-country cost analysis study involving seven countries, the financial cost per person treated ranged from US$0.06 (Burkina Faso) to US$2.23 (Haiti).[5] The study noted the Philippines as one of the countries that had low total program costs for LF elimination and cost per person treated. This is despite the finding that the low-end estimate of the financial cost per person treated was actually higher at US$0.18 but the high-end scenario for the Philippines, which is US$0.28 is just an eighth of the cost of the high end scenario in other countries. The low cost for person-time due to deployment of volunteer workers in the MDA for LF made a significant difference between costs in the Philippines and in the other countries included in the study.[6] However, the study conducted in Sorsogon revealed a wide variability in the

Table 6. Breakdown of economic cost of key program activities according to implementers in 2003

Activities	National (%)	Regional (%)	Provincial (%)	Total in all the municipalities (%)
Training				
Mapping	5.6	13.6	1.7	79.1
Mobilization	0.0	47.4	0.0	52.6
Drug Distribution	31.8	9.2	0.6	58.5

Table 7. Breakdown of financial cost of key program activities according to implementers in 2003

Activities	National (%)	Regional (%)	Provincial (%)	Total in all the municipalities (%)
Training	6.6	9.1	2.0	82.4
Mapping	0.0	49.4	0.0	50.6
Mobilization	15.4	10.8	0.8	73.1
Drug Distribution	18.7	1.5	0.0	79.9
ADR Monitoring	0.0	3.7	4.3	92.0
Surveillance/Lab	7.7	59.9	0.0	32.4
Administration	14.1	11.1	0.6	74.3
TOTAL	**12.8**	**12.2**	**0.7**	**74.4**

implementation of activities and spending among the sampled IUs, which was reflected in the differences in economic costs per persons treated per IU and the coefficient of variation per activity. Despite the low economic cost of implementation of the MDA program in the Philippines, there are still potential opportunities for further cost reduction to optimize limited resources.

In terms of costs classified by level of implementation, the majority of the MDA financial cost is financed at the municipal level (74.4%), followed by the national level (12.8%). This breakdown of financial cost could represent the implementers' commitment to the program. The share in spending at the municipal level could represent effective program co-ownership given the decentralized nature of the health care system. The minor contribution given at the national level, on the other hand, shows that the current

Table 8. Average cost, range and coefficient of variation of cost per person treated at the of implementation units (eight sampled IUs), Sorsogon, Philippines, 2003

Activities	Cost per person Treated		
	Average Cost (in US$)	Cost Range (in US$)	Coefficient of Variation
Training	0.01	0.01 - 0.02	0.13
Mapping	0.81*	0.25 - 1.06	0.42
Mobilization	0.02	0.01 - 0.06	0.29
Drug Distribution	0.05	0.03 - 0.10	0.31
ADR monitoring	0.01	0.01 - 0.02	0.18
Surveillance/Lab	0.28*	0.19 - 0.47	0.39
Administration	0.03	0.03 - 0.04	0.08

government commitment may be uneven when compared with the other sectors involved in the program. The projected total drug budget (DEC and albendazole) for five years is US$17.4 million, of which, only US$369,003 will be used to purchase DEC using government funds. Even though the current budget of the government (to which the DEC fund is taken from) and its expected counterpart contribution is relatively lower than the GSK donation, it is considered essential to achieve LF elimination.

When the MDA program expenses were grouped by source, it showed that the government (inclusive of the national, regional, provincial and municipal levels) and private sectors both gave substantial amounts for the implementation of the MDA program (47.65% and 48.35%, respectively). This highlights the value of partnership-building in the program. The bulk of these contributions from the private sector were sourced out from the GSK donation of albendazole. Other contributions made by the private sectors accounted to only 2.5% of the overall MDA expenditure. Program implementers may focus on strengthening partnerships with these existing donors and linking up with other corporations and organizations, using GSK's involvement as a model for them to follow suit.

The combined contributions of the national and regional levels accounted for 25.0% of the total financial cost, while the provincial level was left with a negligible share (0.7%). This raises the question of how much the provincial level's supposed contribution is being absorbed by the national and regional levels. This may be due to lack of advocacy with local chief executives and the overlapping of Provincial Health Office and Provincial Health Team functions. There may be a need to clarify mandates in activities, especially to those where Provincial Health Team still maintains more active roles. The Provincial Health Office involvement as early as the planning stage would not only create a greater sense of ownership over activities but also help define the roles of the various providers involved.

It was observed that drug distribution accounted for the largest share of the total economic cost (65.2%), with drug supply as its main input. The cost for drug supply was largely due to albendazole (91.0%), which was donated by GSK and therefore was not considered as a financial cost. The financial cost of implementing the program gets markedly reduced with drugs being donated rather than procured.

Cost of person time also accounted for a very large proportion of the total economic costs in all activities. However, these costs differed widely from one IU to another, indicating variability in implementing the elimination program. This variability could be explained by several factors such as differences in the number and type of personnel deployed for particular MDA activities across areas, the varying lengths of time needed by personnel to accomplish assigned tasks, and the difference in travel time needed to reach targeted individuals during the activities, which also translated to

Table 9. Sensitivity analysis of financial and economic costs of mass drug administration in the province of Sorsogon, Philippines, 2004

FINANCIAL	**US$**				**Provincial**			
Cost Center	**Sensitivity factor basis**	**Low Multiplier**	**Medium Multiplier**	**High Multiplier**	**Base Case**	**Low end**	**Medium end**	**High end**
Administration	Person time	0.90	1.10	1.50	18716.50	16,844.85	20,588.14	28,074.74
Mapping	Person time	0.90	1.10	1.50	10764.85	9,688.36	11,841.33	16,147.27
Training	Person time	0.90	1.10	1.50	10086.43	9,077.79	11,095.07	15,129.64
Mobilization	Person time	0.90	1.10	1.50	16326.59	14,693.93	17,959.24	24,489.88
Drug Distribution	Drugs	0.94	1.06	1.30	45860.49	43,108.86	48,612.12	59,618.63
ADR monitoring	Person time	0.90	1.10	1.50	6708.82	6,037.94	7,379.70	10,063.23
Surveillance	Person time	0.90	1.10	1.50	3037.48	2,733.73	3,341.23	4,556.22
TOTAL					111,501.14	102,185.45	120,816.84	158,079.61
cost per person at risk					0.16	0.15	0.17	0.23
cost per person treated/cured					0.20	0.18	0.22	0.28
ECONOMIC	**US$**				**Provincial cost**			
Cost Center	**Sensitivity factor basis**	**Low Multiplier**	**Medium Multiplier**	**High Multiplier**	**Base case**	**Low end**	**Medium end**	**High end**
Administration	Person time	0.90	1.10	1.50	21101.38	18,991.24	23,211.52	31,652.07
Mapping	Person time	0.90	1.10	1.50	11467.72	10,320.95	12,614.50	17,201.59
Training	Supplies	0.90	1.10	1.50	11919.28	10,727.36	13,111.22	17,878.93
Mobilization	Sundries	0.90	1.10	1.50	22700.04	20,430.03	24,970.04	34,050.06
Drug Distribution	Drugs	0.94	1.06	1.30	145792.58	137,045.03	154,540.14	189,530.36
ADR monitoring	Person time	0.90	1.10	1.50	6998.50	6,298.65	7,698.35	10,497.75
Surveillance	Person time	0.90	1.10	1.50	3570.04	3,213.03	3,927.04	5,355.05
TOTAL					223,549.55	207,026.30	240,072.80	306,165.80
cost per person at risk					0.32	0.30	0.35	0.44
cost per person treated/cured					0.40	0.37	0.43	0.55

the relative ease or difficulty of reaching the households. Making local personnel handle most MDA activities would reduce person-time costs. Most local staff would tend to have lower salary grade equivalents than personnel from the DOH and would require less travel time to reach MDA areas. Person time and other program costs could also be reduced by utilizing modern forms of communications such as Short Messaging System (SMS) in order to minimize the need for actual visits to sites or convening meetings.[14]

In terms of program administration, the narrowest range in variance of economic cost per person treated has been observed in Sorsogon City which incurred the lowest program cost while achieving a coverage rate of 80%. The expenditure for administration, accounting for 9.4% of total economic costs, was mostly composed of fixed costs despite the size of the targeted implementation area.

Program planning should consciously consider the capital and recurrent cost centers. Bringing two or more IUs together under an inter-local arrangement where costs can be shared while covering for larger areas could further reduce costs. For recurrent costs such as drug distribution, decreasing the cost of individual inputs may optimize MDA.

This cost study demonstrated a methodology that provides a reasonable estimate of costs that reflect sectoral contributions and variabilities in cost input, activities and output. The process of reviewing costs allowed a review of operations (input, processes and output). This same methodology can be used as a model for other disease control programs.

The results of this cost study can also be used in resource generation efforts by demonstrating LF elimination as a potentially affordable investment. Goldman et al. showed that MDA for LF elimination is comparatively inexpensive in relation to most other public health programs.[6] In fact, a huge amount of program resources required has already been provided for by GSK. This means that other donors with more limited budgets can contribute to a major effort even with little funding. This information is crucial to potential donors as they choose among competing health needs given limited resources.[6] It also allows grant seekers to present more precise and research-based figures as to how the money being asked for will be spent.

Conclusion

In conclusion, the study determined the costs associated with MDA implementation in the province of Sorsogon, Philippines. To eliminate filariasis, local government units need to take on substantial cost burden while the national government would have to continue assisting the local government with drugs and technical assistance. While current donor support is sufficient it needs to be sustained over time until elimination is achieved. The variations in cost across types of MDA activities and IUs may indicate variations in the execution of program activities. Further analysis of the determinants of these variations could help identify areas for cost reduction in the future.

Limitations of the study

This study did not assess the effectiveness of the fixed site distribution and house-to-house distribution strategies in terms of coverage rates or cost reductions. Other factors such as geographic terrain and transportation networks were not assessed in detail and population density was used as proxy for these factors.

Competing interests

The authors declare that they have no competing interests.

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