

MALTEM PROJECT: Quantifying the economic impact of malaria control interventions in Maragra, Mozambique: a win-win for private industry and public health

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Summary

This document serves to give an overview of the rationale for assessing the impact of malaria control interventions on economic outputs, as well as the advantages of such an analysis, from both the perspectives of the research team (CISM, ISGlobal), as well as Maragra Açucar, CA.

(+ Researchers specific to this sub-project)

(++ Over-arching project - MALTEM economic protocol associated researchers)

(+++ Maragra Açucar CA)

Background

The burden of malaria is extremely high in Mozambique, even by regional standards (Brundtland, 1999). With a prevalence as high as 40%, malaria accounts for 29% of all deaths, and 42% of deaths among children under five (USAID, 2011). Nearly a quarter of maternal deaths are due to malaria (K. Singh *et al.*, 2014).

In addition to malaria's impact on the health of its victims, the illness also has major economic consequences for the ill. 32-34% of households incur malaria-related costs which rise to the level of "catastrophic" per the World Health Organization's standards (ie, 10% of household income or 40% of non-food income) (Castillo-Riquelme *et al.*, 2008). Though the burden of malaria is decreasing (Murray *et al.*, 2014), the costs of the disease at the individual level remain enormous, given that the disease affects primarily those with low socioeconomic status.

The economic effects of malaria are not only absorbed by its direct victims, but also by the economy as a whole. Malaria control has been found to be associated with population-level economic growth in multiple studies (Barofsky *et al.*, 2015). By eliminating early-life blocks on the development of a population's human capital, the returns on a reduction in malaria's burden are long-term and exponential.

From a public health perspective, the case for the need to control and eventually eradicate malaria is strong and has been made clear in multiple studies across time and geography. However, the role which private firms which operate in malaria endemic regions can be expected to play is less obvious, given the current lack of compelling evidence regarding the return on investment in short- and medium-terms for privately-funded malaria control activities. To the extent that many firms already carry out some form of "in-house" malaria control, analyzing those firms' data offers the unique opportunity to assess whether the benefits (in purely economic terms) of those activities outweigh the costs, or vice-versa.

Though private, foreign-owned firms are a potential source of funding for malaria control and eradication, it is not reasonable to expect significant participation at the population level without a clear demonstration of the value proposition from a private perspective. Though the non-tangible benefits of "corporate social responsibility" (good publicity, etc.) are certainly appealing to private firms, investment would likely increase significantly if the costs and benefits of malaria

control from a purely economic perspective were quantified. On the one hand, if it can be compellingly demonstrated that privately-funded malaria control interventions offer a significant return on investment, this evidence could entail an organic/spontaneous investment increase across the country. On the other hand, if it were found that private foreign investment is not cost-effective from the perspective of private foreign firms, then this may spur donors and the public sector to better coordinate, scale, and work with firms to fill the gaps.

Ultimately, the justification for this study is opportunity. Maragra Açucar CA has sophisticated sophisticated systems for inventory, employee activities, and even health. Analyzing the outputs of those systems offers the chance to improve business and health: a true win-win.

Advantages

From a public health perspective

Cooperating with Maragra will entail multiple benefits from the perspective of both research and public health. Especially in light of the Mozambican Alliance Towards the Elimination of Malaria's increased activities, understanding the experience of Maragra is vital to program strategies and efforts.

Specifically, the research team benefits from this collaboration in the following ways:

- Access to a rich dataset on both the temporal and spatial dimensions of malaria control interventions.
- Access to a rich dataset on the social and demographic characteristics of workers targeted by those interventions.
- Access to health and economic outcomes.

From Maragra's perspective

Maragra Açucar can also benefit directly from this collaboration. Specifically, potential areas of interest include:

- The cleaning and digitization of clinic data.
- Study results pertaining to absenteeism and productivity which could have an impact on operations.
- A side cost-effectiveness analysis which could be useful from a business perspective.

The data needed

Individual level data (i.e., data per worker) will be needed. Individual information on absenteeism (possibly with the reason of absenteeism), age, gender, job position, workers' place of residence, educational level, information on whether the worker is a migrant and if yes, when and how long the worker lives and distance to job are all of great importance for this study.

In the best case scenario, a complete panel data (e.g., monthly individual data) would allow to discern how malaria control activities are translated into the outcomes of interest, in time.

In addition, available information on malaria control activities is needed on: - type of activity: bed nets distribution, fumigation, etc; - when these activities have been carried out: exact dates; - who carried out such activities: Maragra Açucar or Ministry of Health; - where the activities are carried out: "barrios". Importantly, both workers data and information on malaria control activities should be available for a period of, at least, 5 years.

Table 1: Worker characteristics

This table should consist of all known characteristics regarding to workers. This includes (but is not limited to) age, sex, location of residence, type of work, salary, place of origin, etc.

id	name	sex	residence	type	origin	contract	education_yrs	religion	contract_start	contract_end
1	Joao	M	Bairro 1	Field	Manhiça	p	5	Catholic	2010-12-16	still
2	Eusebio	M	Bairro A2	Field	Manhiça	v	10		2012-08-26	still
3	Maria	F	Bairro 13	Field	Manhiça	g	2	Evangelical	2013-01-29	2012-09-26
4	Ana	F	Bairro 4	Secretarial	Maputo	u	6	Evangelical	2012-08-08	still
5	Pedro	M	Bairro 1	Management	Maragra	w	4	Catholic	2010-08-09	2013-04-14

Table 2: Worker attendance / absences

This table should consist of one row for each day that an employee was employed.

id	date	status
1	July 03, 2012	present
1	July 04, 2012	present
1	July 05, 2012	present
1	July 06, 2012	late
1	July 07, 2012	late
2	July 03, 2012	late
2	July 04, 2012	present
2	July 05, 2012	present
2	July 06, 2012	present
2	July 07, 2012	present

Table 3: Worker health

This table should consist of one row for every visit to the Maragra clinic, indicating both the id number of the worker/patient being attended and the date, as well as the reason for the visit (and discharge diagnosis, if available).

id	date	reason
692	August 05, 2010	accident
447	January 21, 2011	fever
308	May 10, 2011	accident
729	October 03, 2011	accident
674	May 23, 2012	accident
175	June 20, 2012	vomiting
281	May 21, 2013	fever
203	June 29, 2013	malaria
667	August 13, 2013	unknown
946	October 16, 2013	left before being seen

Table 4: IRS activities

This table should consist of any information pertaining to indoor residual spraying, at the most granular level possible.

date	longitude	latitude	address	chemical
April 14, 2010	-3.27	-33.58	House 435, Lot K	DDT
May 24, 2010	-3.52	-33.90	House 867, Lot H	DDT
June 24, 2011	-3.99	-33.04	House 118, Lot M	DDT
July 05, 2011	-3.77	-33.18	House 498, Lot Q	DDT
March 19, 2013	-3.85	-33.62	House 940, Lot B	DDT
May 21, 2013	-3.19	-33.01	House 87, Lot A	DDT
June 30, 2013	-3.59	-33.84	House 624, Lot Y	DDT
August 07, 2013	-3.67	-33.54	House 412, Lot O	DDT
January 13, 2014	-3.13	-33.88	House 456, Lot F	DDT
September 30, 2014	-3.96	-33.85	House 215, Lot X	DDT

Table 5: Bednet distribution activities

If available, this table should include any information regarding either the distribution or presence of bednets among workers.

id	date	nets.distributed	number.of.residents
641	January 26, 2010	1.00	7
866	October 13, 2010	3.00	4
350	March 28, 2012	1.00	8
662	August 13, 2012	3.00	1
904	March 19, 2013	1.00	6
973	June 27, 2013	2.00	5
10	October 12, 2013	1.00	1
184	December 18, 2013	1.00	6
8	March 14, 2014	3.00	6
372	July 29, 2014	2.00	5

Table 6: Costs

If available, this table should include any cost information pertaining to malaria control activities (IRS or bednet distribution) carried out by Maragra.

date	item	amount	currency
July 01, 2010	Purchase of spraying equipment	50471	Rand
December 12, 2010	Salary of sprayers	72570	Rand
March 02, 2011	Salary of sprayers	58791	Meticaïs
December 18, 2011	Purchase of bednets	40827	Meticaïs
February 13, 2012	Gas for distributing bednets	7525	Meticaïs
March 11, 2012	Misc office items	57452	USD
June 21, 2013	Salary for bednet distributors	37293	Meticaïs
January 28, 2014	Purchasing of bednets	38303	Rand
April 07, 2014	Purchase of spraying equipment	85270	Rand
July 28, 2014	Purchase of insecticide	96043	USD

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