

## Disease losses to agriculture The impact of malaria in north-east Nigeria

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### Key messages:

1. Labour productivity in developing countries is often low. One cause of that is ill health of agricultural workers.
2. Careful studies of farm labourers in Nigeria show that diagnosing and treating the endemic malaria that repeatedly affects the labourers delivers monetary benefits that exceed the cost of treatment. Even workers who tested negative for malaria, worked and earned more when they knew their status.
3. Even if most of the benefits from malaria health care accrue to individuals who might then be expected to seek out and pay for medical attention, benefits to family members and employers, plus imperfect perceptions by workers of the value of testing and treatment, suggests public provision of services should be increased.

This brief summarises and sets in context the results of the DEGRP-funded research project *Malaria, productivity and access to treatment*. Led by Andrew Dillon at Michigan State University, the research looks at the impact of poor health on labour productivity in Nigeria's agriculture sector.

### Health and productivity in the agriculture sector

Labour productivity in agriculture is usually lower than that in other sectors, especially in developing countries. The differences in productivity can appear very large indeed: for example, for 113 developing countries since the mid-1980s, the mean difference between productivity in agriculture and that in other sectors was about four times — that is, workers in agriculture were producing just one quarter as much as those in other sectors (Gollin et al. 2014).

Questions have been raised over how well agricultural labour productivity is measured compared to that in other sectors. The size of the productivity differences between sectors falls if human capital, in the form of education, is taken into account (Gollin et al. 2014). Perhaps more important is the number of hours worked: owing to the seasonality of agriculture, farm labourers cannot work as long as those in other sectors.

McCullough (2015) computes agricultural labour productivity per hour in four African countries to find that when the shorter time spent farming is taken into account, productivity differences per hour worked disappear. In part, she attributes the short hours to the lack of work on offer in agriculture, which may understate the importance of seasonality.

Another factor, however, also affects labour productivity: ill health. This is not all that surprising: the same humidity that makes many rural locations particularly apt for farming also makes them unusually unhealthy, as humidity can allow vectors of disease to multiply. Malaria spread by mosquitoes is a prime example, but it is not the only one: sleeping sickness and river blindness are also common in humid areas. Moreover, rural areas often lack medical services, so diseases are not treated in the way they might be in urban areas.

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Despite this, the effects of ill health on agriculture are rarely considered, and studies of the impacts of ill health on farming are uncommon, with a few notable exceptions.

When the prevalence of HIV/AIDS rose alarmingly in the early 2000s in parts of eastern and southern Africa, among the many studies of the disease were those that tried to assess the economic losses, including those arising in agriculture. Such studies often reported heavy costs. For example, when adults in prime age in Kenya died, the gross value of crops produced by the farm household typically fell by 57% (Yamano & Jayne, 2002). A similar loss was estimated by the Government of Swaziland, which reported a 54% fall in agricultural production in households where one or more adults have died by AIDS or other causes (Thurow, 2003).

These suggest that the economic costs of poor health in rural areas are significant, over and above the personal suffering of illness and the additional burdens on carers in the form of (almost always unpaid) care. All of this raises the question of whether more investment in health care might pay off directly in higher agricultural productivity and production.

This is not only a public concern; but it is also a private concern for employers of farm labour on a significant scale. Employers are encouraged to provide decent living conditions for their staff, but reports of estate labour living in poor housing with unhealthy water and unsafe sanitation can be found (Smalley 2013). Would it then be in the employer's own interest to improve the health environment, and provide treatment for common ailments?

### The DEGRP research

The studies reported here set out to investigate the links between disease, work effort, output and earnings in agriculture. The team was made up of researchers from the universities of East Anglia, Michigan State, and Modibbo Adama University of Technology in Adamawa State, Nigeria.

The setting was a large, 5,700 hectare irrigated sugar estate in north-eastern Nigeria. The sugar cane is harvested by hand, cut by gangs of labourers during a season that runs from November to mid-April. Some 680 labourers are engaged, all of them men and most of them young, with an average age of 30 years. They are transported to the estate from surrounding villages every day, then taken home at the end of the day.

The labourers can opt for one of two tasks when they arrive in the morning. They can either cut cane, being paid a piece rate for the number of cane rods of a standard two-metre length they cut. Or they can opt to 'scrabble' - collect the cut cane rods, and bundle them ready to be transported to the mill. This work is paid by a day rate.

Cane cutting is hard work, but cutters can make the equivalent of US\$7 a day. In an area where almost three-quarters of the local population live in deep poverty, living on less than US\$2 a day per person, the chance to earn US\$7 a day is attractive. Scrabbling requires less effort, but the day rate is roughly half what the cane cutters can make. Not surprisingly, then, most of the men bussed in to the estate opt for cutting, but have the scrabbling option if they lack energy.

This part of Nigeria has endemic malaria: the local population suffer frequently from the disease. Malaria manifests itself as fever, headaches, nausea and general malaise. Attacks generally last 14 days, including four to six days when the symptoms effectively leave the sufferer completely incapacitated. Hence the labourers on the estate lose possible work time to malaria, or in the lesser stages of the disease either have to opt for scrabbling or, if cutting cane, are less active, cut less cane and earn less.

To confirm the expected relation between malaria and worker productivity, and to measure the degree of the disease's impact, the research team offered some of the workers a malaria test, based on a blood smear that was then put under a microscope in a laboratory to count the number of parasites seen in the blood. Beyond a threshold number of parasites, the workers were

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considered to be suffering from the disease. They were then offered Artemisinin Combined Therapy (ACT) to cure their malaria. ACT also usually protects the patient, for a time, from a recurrence. Those workers who were not found to have malaria were told that they were not suffering from it.

The selection of workers to be tested and treated was randomised with all workers eventually tested. Their disease status could then be compared to estate records of the workers that showed the days worked, the length of cane cut, and their earnings.

The study was carried out in such a way that it was possible to isolate the malaria diagnosis and treatment from other factors, and then compare this relatively precisely to the effects in work chosen, hours worked, cane cut, and earnings. For example, selection of workers was randomised through time. When a worker was diagnosed as having malaria, it could reasonably be inferred that they had had the disease in the days preceding the test.

This allowed the observation of the behaviour of workers suffering from the disease, who could then be matched against other workers who had tested negative for malaria and who could thus be considered to be free from the disease in the period immediately before and after the test.

In addition, the study team asked some of the workers if they would wear an accelerometer: the same sort of simple, relatively unobtrusive devices that have become popular for measuring fitness effort in high-income countries. This allowed the study team to measure the levels of activity of the workers who were wearing the devices.

## Findings

Just over one third of the workers tested were found to be suffering from malaria. After treatment, they worked more days than those who were not treated, and showed a small gain in productivity when at work. The accumulated additional earnings over three weeks was worth

US\$9. This exceeded the cost of the ACT treatment at US\$5–7.

This probably understates the full value of diagnosis and treatment. The benefits of treatment may well extend past three weeks. Wages gained understate the full value of extra work, since the estate does not pay out the entire value of cane cutting in wages. No monetary value, moreover, is assigned to the clear and simple benefit to the workers of feeling better. Finally, some benefits may well accrue to the rest of the household from having a member who is not sick: it saves on time spent caring — usually by women who often have heavy work-loads in any case.

What about the workers who tested negative for malaria? Interestingly, they also produced more once they knew their status. They did not necessarily work more days, but when they were at work they cut more cane and earned more as well. Since in their case no treatment was given, their health was unchanged. It is then curious that they apparently worked harder.

The explanation may lie in the value of accurate information. Workers who may have been feeling under the weather for all manner of reasons, might well have inferred they had malaria, and hence believed they could not fully work. Given the diffuse symptoms of malaria, several other conditions could resemble the disease. Once they learned they did not have malaria, they presumably felt then that they could work harder.

The data from the accelerometers proved to correlate with work performance. Those whose devices showed higher levels of activity were those who cut more cane and earned more.

## What does this teach us?

This research confirms, with considerable rigour and precision, that disease has significant economic costs — and that for malaria, these are higher than the cost of treatment. From society's point of view, health spending to diagnose and cure malaria is justified.

Since most of the benefits of treating malaria accrue to the sufferer, diagnosis and treatment may be seen as a private good, one where those affected should logically be prepared to seek out and pay for diagnosis and treatment. But that would over-simplify. Labourers with malaria may not realise just how much the disease costs them. Being tested may be seen as an unnecessary expense, especially by those who are told that they do not have the disease.

Moreover, some of the benefits of a cure accrue to others: employers who get more active labour, domestic carers who spend less time taking care of the sick.

Such considerations suggest that services should be free, or subsidised. They may be offered by public clinics, the calculus being that overall benefits of treatment to the economy will generate tax receipts that will cover the costs of free or subsidised public services. Employers, however, might also consider offering the services, perhaps making deductions from the overall wage bill to cover the cost — workers might see a small cut in the piece rate, but their better health would see their earnings rise.

#### Key project outputs

Dillon, A., Friedman, J., & Serneels, P. (2014) 'Health Information, Treatment, and Worker Productivity. Experimental Evidence from Malaria Testing and Treatment among Nigerian Sugarcane Cutters', [Policy Research Working Paper 7120](#). Washington DC: World Bank.

Akogun, O., Dillon, A., Friedman, J., Prasann, A. Serneels, P. (2017) 'Productivity and health: alternative productivity estimates using physical activity', [Policy Research Working Paper 8228](#). Washington DC: World Bank.

## References

Gollin, D., Lagakos, D., & Waugh, M.E. (2014) 'The agricultural productivity gap', *The Quarterly Journal of Economics*, 129 (2): 939-993.

McCullough, E. (2015) 'Labor Productivity and Employment Gaps in Sub-Saharan Africa', Policy Research Working Paper 7234, Washington DC: World Bank.

Thurow, R. (2003) 'AIDS fuels famine in Africa as Swaziland farmers die, their land goes unplanted', *Wall Street Journal*, 9 July 2003.

Yamano, T. & Jayne, T.S. (2002) 'Measuring the impacts of prime-age adult death on rural households in Kenya', Staff Paper 2002-26, Department of Agricultural Economics, Michigan State University.

Smalley, R. (2013) 'Plantations, Contract Farming and Commercial Farming Areas in Africa: A Comparative Review', Working Paper 055, Brighton, UK: Future Agricultures Consortium.

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