

Over-and under diagnosis of malaria at health facilities in Tanzania: Implications for developing composite indicators of appropriate treatment based on malaria parasitemia status

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Background

- Artemisinin based combination therapy (ACT) is the first line drug for malaria in most endemic countries, but there are concerns that quality of care remains poor. Patients needing ACT do not receive it, but there is also considerable over treatment due to the lack of accurate diagnosis and inappropriate management.
- Given the importance of treating patients according to their parasitemia status, there is a need to develop composite indicators of appropriateness of antimalarial treatment that take this into account.
- We conducted surveys in government health facilities in three regions of Tanzania to assess appropriateness of treatment prior to national scale-up of rapid diagnostic tests (RDTs) and to assess the usefulness of a range of composite indicators of appropriate treatment.

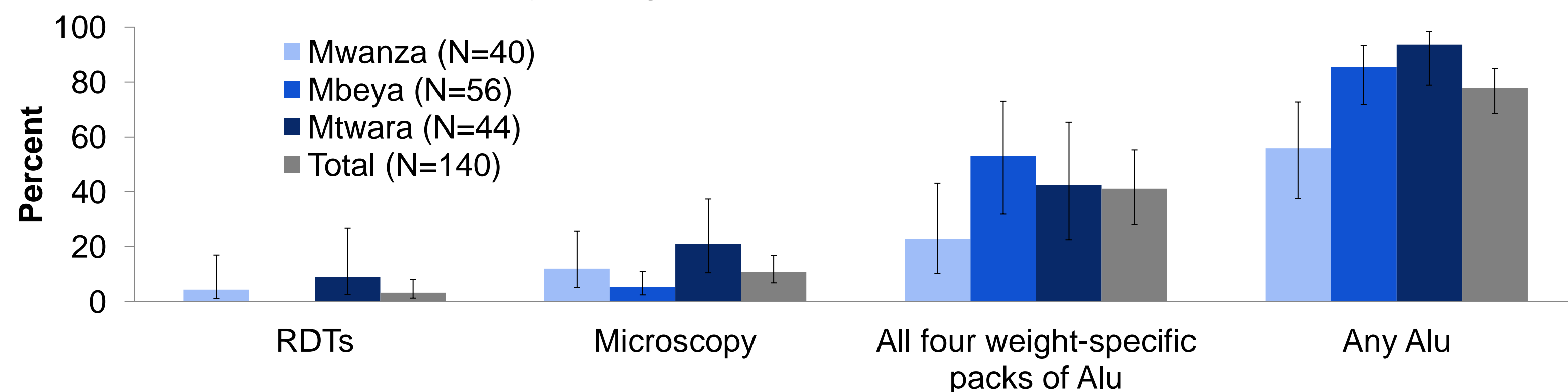
Methods

- 140 health facilities (11 hospitals, 24 health centres, and 105 dispensaries) were randomly selected with population proportional to malaria outpatient utilization rate in Mwanza, Mbeya, and Mtwara regions.
- Between May and October 2010, 1746 patients presenting with fever in the previous 48 hours were enrolled on arrival to the health facility.
- Following their consultations, patients were interviewed about demographic information, previous treatment for fever, and care received at the facility. Finger prick blood samples were taken by study staff to test for malaria parasitemia.

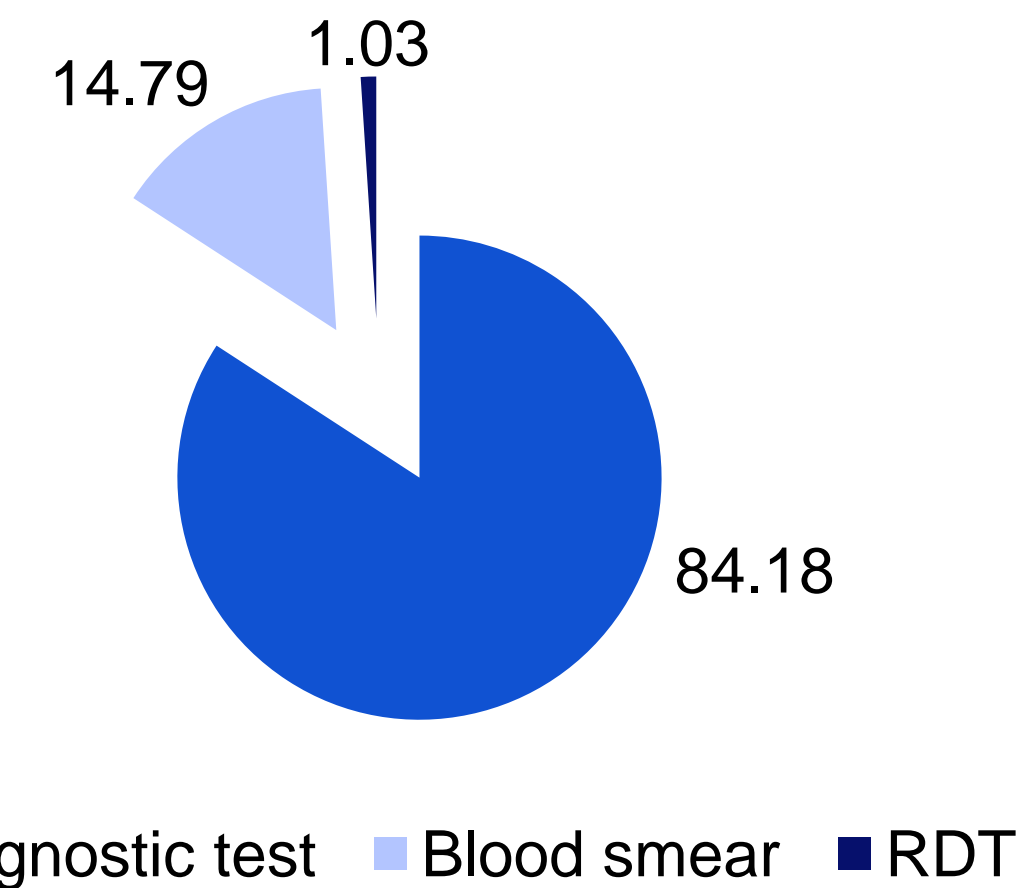
Results

- Of 1746 patients interviewed, 1033 were under five years old, while 713 were age five or above. 18.8% had previously sought care at a another source, and 1.3% had obtained an ACT at another source.
- 77.8% of health facilities had any artemether-lumefantrine (ALu), the government-recommended ACT, in stock, and 41.1% had all four weight-appropriate doses in stock. Stock-outs were most frequent in Mwanza (Figure 1).
- Of 1651 patients tested by study blood smear, 6.6% tested positive in Mwanza, 1.6% in Mbeya, and 20.9% in Mtwara. Overall, 12.3% of patients under five years old and 9.2% of all patients had a positive study blood smear.
- Only 15.9% of patients were tested for malaria by health workers at the facility. Sensitivity and specificity of facility-based diagnostic tests compared to study blood smears were 86.1% and 52.7%, respectively.
- ACTs were obtained by 67.1% of all patients with a positive facility test (73.7% if restricted to subset of facilities with ALu in stock). An antimalarial was obtained by 25.2% of all patients with a negative facility test and 42.1% of all untested patients.
- Based on study blood smears, 65.8% of patients testing positive, 39.0% of patients testing negative, and 41.1% of patients overall obtained an ACT. 91.1% of patients obtaining ALu received the correct dose by weight.

Availability of diagnostics and ACTs at health facilities



Percent receiving diagnostic test at health facility by type



Treatment received at health facilities

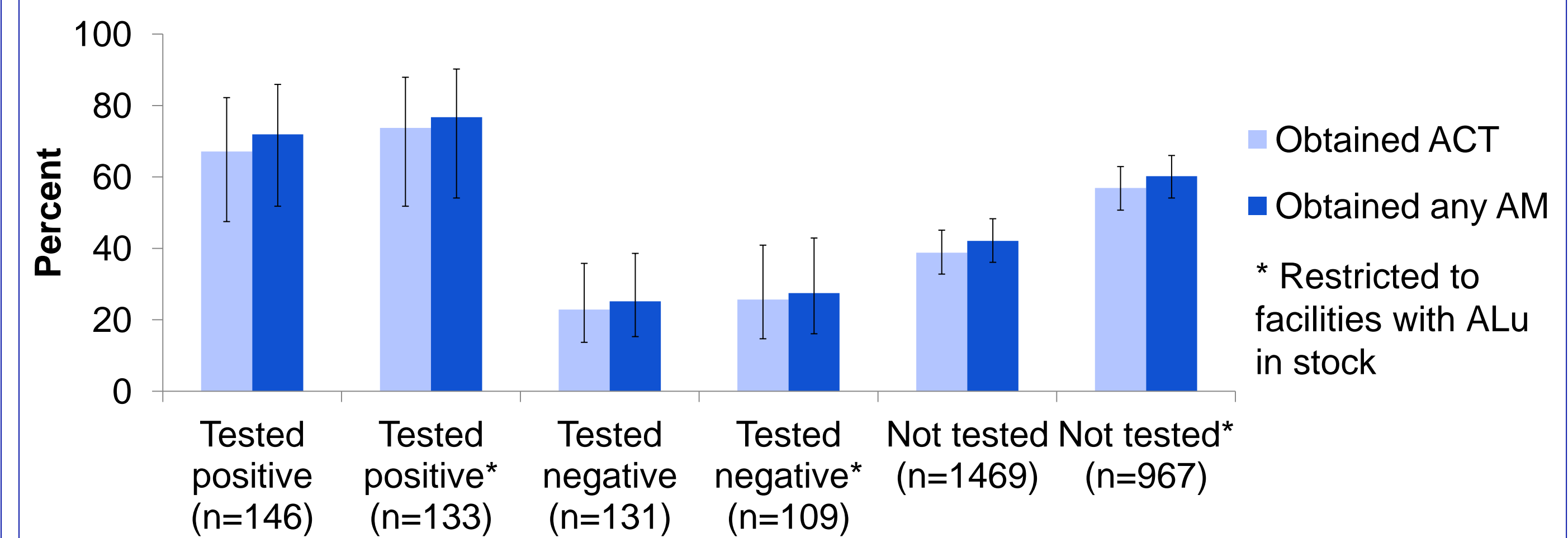


Table 2: Potential composite indicators of appropriate antimalarial treatment [Percent (95% CI)]

	Mwanza	Mbeya	Mtwara	<5	≥5	Total
Patients with interview data and study blood smear results (N)	604	553	492	984	665	1649
Base case: Appropriate antimalarial treatment given study blood smear result ¹	74.3 (66.1, 81.2)	48.6 (39.2, 58.2)	50.2 (43.5, 56.9)	55.4 (49.8, 60.8)	63.2 (56.5, 69.4)	58.5 (53.6, 63.3)
Variant 1: With compliance of provider to correct dose for weight ²	74.0 (65.6, 80.9)	48.3 (38.8, 57.9)	47.8 (41.3, 54.3)	54.3 (48.8, 59.7)	62.4 (55.8, 68.6)	57.6 (52.7, 62.3)
Variant 2: Adjusting for previous antimalarial treatment ³	74.3 (66.1, 81.2)	48.6 (39.2, 58.2)	50.0 (43.2, 56.8)	55.3 (49.7, 60.7)	63.2 (56.5, 69.4)	58.5 (53.6, 63.2)
Patients with interview data and study blood smear results at facilities with ALu in stock (N)	269	432	462	696	467	1163
Variant 3: Base case restricted to facilities with ALu in stock ⁴	59.1 (47.5, 69.8)	37.5 (28.7, 47.2)	49.6 (42.5, 56.7)	43.1 (37.7, 48.7)	53.3 (45.4, 61.5)	47.3 (42.1, 52.6)

¹[pos study BS +ALu at facility] + [neg study BS + no AM at facility] / N with study BS & interview data

²[pos study BS +ALu at facility + correct dose for weight] + [neg study BS + no AM at facility] / N with study BS & interview data

³[pos study BS +ALu at facility + no ALu previously] + [pos study BS + ALu previously + quinine at facility] + [neg study BS + no AM] / N with study BS & interview data

⁴ [pos study BS +ALu at facility] + [neg study BS + no AM at facility] / N with study BS & interview data at facilities with ALu in stock

Discussion

- Over- and under-treatment of malaria is still common in Tanzania, even among patients that are tested for malaria. While national scale-up of RDTs may address this to some degree, high prevalence of ACT stock-outs and inappropriate health worker practices remain significant problems.
- Our base composite indicator for appropriate antimalarial treatment reveals that 58.5% of patients were treated appropriately for malaria based on their true parasitemia status. This indicator varies only slightly when adjusted for previous ACT treatment or correct dose for weight, but drops to 47.3% when restricted to only those facilities with Alu in stock.
- Performance according to the base case composite indicator appeared relatively good in Mwanza compared to the other two regions. However, this may be misleading as Mwanza's stronger performance mainly reflected the high ALu stock-out rates in this region, which meant that antimalarials were more rarely given to patients without parasitemia.
- There is a need to develop more robust indicators of appropriate treatment with ACTs given patients' parasitemia status. Options may include weighting the indicator to give greater weight to correct antimalarial treatment of those with parasitemia or the use of an alternative "balanced scorecard" approach.

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