Assessment of key malaria vector control activities within program areas of the Trans Kunene Malaria Initiative (TKMI) / Isdell:Flowers Cross Border Malaria Initiative (IFCBMI) in four border municipalities of Cuando Cubango Province, Angola between 2020-2022

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Background

- Through the Trans Kunene Malaria Initiative (TKMI), the Isdell:Flowers Cross Border Malaria Initiative (IFCBMI) supports community-based implementation of malaria control activities within 4 municipalities of Cuando Cubango Province, Angola: Calai, Cuangar, Dirico, and Rivungo.
- The strategic border position of these municipalities makes them priority areas for malaria elimination efforts, as indicated by previous funding requests of the SADC Elimination 8 Secretariat to The Global Fund and the Bill & Melinda Gates Foundation.
- Though classified nationally as only at "moderate risk" (300-500 annual cases per 1,000 people), Calai, Cuangar, Dirico, and Rivungo municipalities are seen as strategic border reservoirs of the malaria parasite and are some of Angola's few targeted areas for annual universal indoor residual spraying (IRS) campaigns. Mass insecticide treated net (ITN) distribution last occurred in these municipalities in 2018.

Objective

This study aimed to track key indicators within TKMI / IFCBMI program areas in Cuando Cubango Province, Angola on an annual basis to assess indicators of vector control implementation, including: 1) Household IRS coverage within the prior 12 months; 2) Access to ITNs; 3) Use of ITNs.

Methods

- **Study design:** Yearly cross-sectional household survey administered through a structured questionnaire on KoboCollect platform.
- **Sampling frame:** TKMI / IFCBMI program areas in Cuando Cubango, Angola (Figure 1, circled in red).
- **Sample size:** Based on power calculation intending to achieve at least 80% power to detect annual incremental improvements in key outcome measures.
- **Sampling:** Geographically stratified random sampling of households. Respondents were female, ≥18 years, and provided informed consent.
- **Data collection:** Jun-Aug 2020, May-Aug 2021, May-Jun & Sept 2022.
- **Data analysis:** Descriptive statistics were calculated with 95% confidence intervals. Statistical tests to compare differences in outcomes over time included unadjusted logistic regression (dichotomous variables) and OLS regression (continuous variables) of the outcomes on an indicator for survey year. The significance threshold was set at .05. Data was analyzed in STATA v14.2.
- **Ethical considerations:** This study was approved by the ethical committee of the Ministry of Health in Angola.

Figure 1. TKMI / IFCBMI program areas

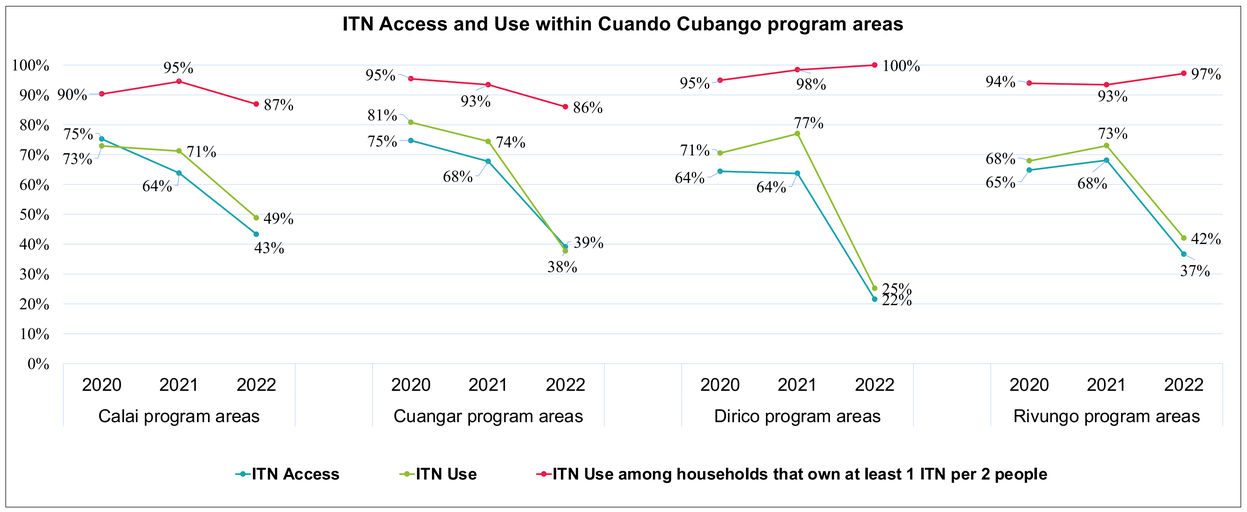
Table 1. Household demographics

	2020	2021	2022
Sample size	2805	2249	1876
Avg. no of people who slept in the household last night	3.5	4.6	4.7
Avg. no of sleeping spaces in the household	1.7	2.1	2.0

Results

Insecticide treated nets (ITNs)

- ITN Access and ITN Use have decreased between 2020-2022 across all four municipalities.
- However, among the subset of households that own at least 1 ITN for every 2 people who slept in the household the previous night, ITN Use has remained relatively high between 2020-2022 and has even increased between 2021-2022 in Dirico and Rivungo Municipalities.
- The ITN Use:Access Ratio (Table 2) has remained ≥1.0 between 2020-2022 across all four municipalities, showing that behavior is likely not a driver of low overall ITN Use, but rather access. Ratios over 1.0 indicate that, on average, more than two people are sleeping under each ITN.



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Indoor residual spraying (IRS)

- Household IRS coverage has reached or come close to WHO-recommended levels (≥85%) in Calai and Cuangar program areas in 2020, 2021, and 2022, but has fallen short of that benchmark in Dirico program areas (all years) and Rivungo program areas (2020 and 2022).
- Rivungo program areas had improved household IRS coverage in 2021 (84.5%) compared to 2020 (47.4%), but then dropped to low coverage again in 2022 (43.3%). The most common reason given for why a household didn't receive IRS in Rivungo program areas was "no one came to my household to offer IRS" in both 2020 and 2022 survey years.
- IRS refusals are low across all areas.
- Across all three survey years, between 6-13% of households said they didn't receive IRS within the past 12 months because they were "not at the household when IRS was offered."
- Dirico program areas have the highest proportion of households who reported not receiving IRS because their "household is ineligible for IRS."
- Note: Yearly survey results typically represent the prior year's IRS campaign (since survey data collection occurs in May-Aug and households are asked about the prior 12 months).

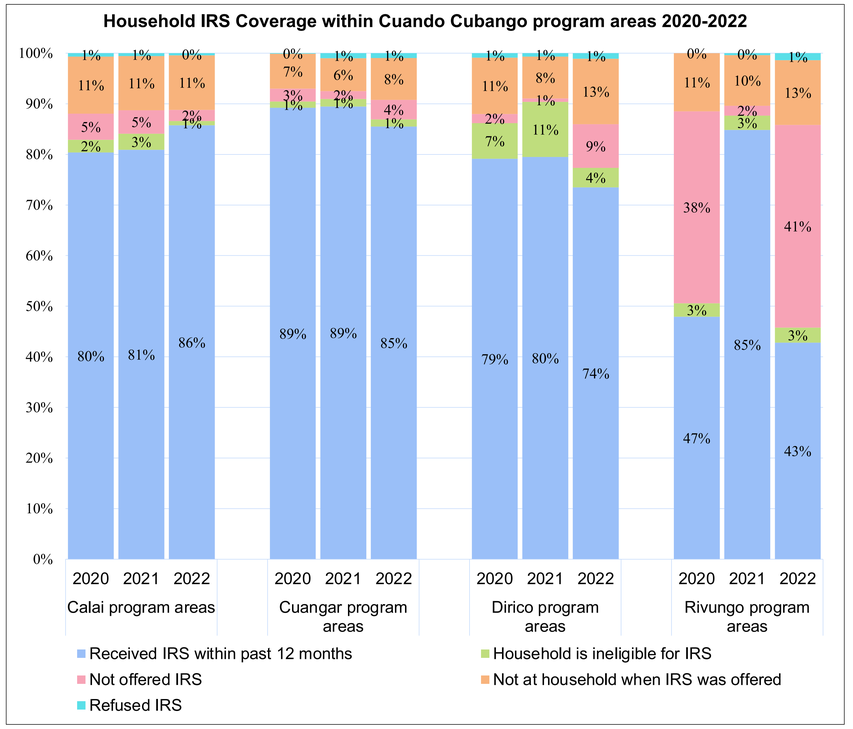

Table 2. Results

	Cuando Cubango (all program areas)			Calai program areas			Cuangar program areas			Dirico program areas			Rivungo program areas		
	2020	2021	2022	2020	2021	2022	2020	2021	2022	2020	2021	2022	2020	2021	2022
Household IRS coverage	76.8%	85.4% p=<0.001 (6.7, 10.3)	73.3% p=<0.001 (-15.2, -9.1)	80.2%	80.9% p=0.819 (-5.5, 5.6)	86.1% p=0.100 (-1.2, 9.9)	89.2%	88.9% p=0.818 (-3.2, 2.0)	85.4% p=0.022 (-7.3, -0.6)	79.0%	79.5% p=0.879 (-6.2, 5.9)	73.5% p=0.095 (-14.3, 0.9)	47.4%	84.5% p=<0.001 (32.9, 40.5)	43.3% p=<0.001 (-48.6, -33.6)
ITN Access (% of people with access to an ITN, assuming 1 ITN covers 2 people)	71.2%	66.7% p=<0.001 (-6.5, -2.6)	36.5% p=<0.001 (-32.5, -27.9)	75.2%	63.8% p=<0.001 (-16.4, -6.6)	43.3% p=<0.001 (-26.5, -14.5)	74.7%	67.7% p=<0.001 (-9.8, -4.2)	39.1% p=<0.001 (-32.0, -25.2)	64.4%	63.7% p=0.783 (-6.2, 4.6)	21.5% p=<0.001 (-48.0, -36.4)	64.8%	68.1% p=0.125 (-0.9, 7.6)	36.6% p=<0.001 (-36.4, -26.8)
ITN Use (% of people who slept under an ITN last night)	75.2%	73.9% p=0.265 (-3.5, 0.9)	38.4% p=<0.001 (-38.2, -32.8)	72.9%	71.2% p=0.572 (-7.3, 4.0)	48.8% p=<0.001 (-29.7, -15.1)	80.8%	74.4% p=<0.001 (-9.5, -3.2)	37.7% p=<0.001 (-40.6, -32.8)	70.5%	77.0% p=0.031 (0.6, 12.5)	25.2% p=<0.001 (-58.5, -45.2)	67.9%	73.0% p=0.034 (0.4, 9.8)	42.0% p=<0.001 (-36.5, -25.5)
ITN Use, among households with at least 1 ITN for every 2 people	94.1%	94.1% p=0.950 (-1.6, 1.8)	90.2% p=0.025 (-7.4, -0.5)	90.3%	94.5% p=0.091 (-0.7, 9.1)	86.9% p=0.152 (-18.1, 2.8)	95.4%	93.4% p=0.100 (-4.4, 0.4)	86.0% p=0.008 (-12.9, -1.9)	94.9%	98.4% p=0.022 (0.5, 6.5)	100% p=0.061 (-0.1, 3.3)	93.9%	93.4% p=0.810 (-4.3, 3.3)	97.2% p=0.099 (-0.7, 8.3)
ITN Use:Access Ratio (ratio of ITN Use to ITN Access, avg. of each household's ratio)	1.1	1.2 p=<0.001 (3.6-8.5)	1.1 p=<0.001 (-11.3, -3.6)	1.0	1.2 p=<0.001 (9.8, 22.3)	1.2 p=0.936 (-9.2, 9.9)	1.1	1.2 p=0.259 (-1.5, 5.6)	1.0 p=<0.001 (-21.8, -9.6)	1.2	1.3 p=<0.001 (5.8, 17.9)	1.2 p=0.206 (-15.4, 3.3)	1.1	1.1 p=0.151 (-1.4, 9.2)	1.2 p=0.083 (-0.7, 12.0)

Conclusions

- Households in Cuando Cubango report using existing nets. However, insufficient access to ITNs contribute to low overall ITN use. Though ITNs were widely distributed in 2018, by 2022, households report no longer having adequate net access.
- IRS refusal is low. Where coverage gaps are high (particularly in Rivungo Municipality, the area most difficult to reach from the provincial capital), households report not having been offered IRS.
- Community leaders in the surveyed areas are currently developing community plans for advocacy and action to move towards improved coverage and use of vector control interventions.

Limitations

While results are representative of TKMI / IFCBMI program areas, results cannot be directly extrapolated to the municipality or provincial level since the TKMI / IFCBMI program doesn't cover those areas in their entirety. However, the study areas are key border areas and therefore results are relevant to the effort of reginal malaria elimination.

Acknowledgements

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