A model health systems strengthening strategy to reduce malaria deaths in the Busoga sub-region, Uganda: a proof-of-concept trial

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Investigators

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Background

- Malaria is the leading cause of childhood deaths in Uganda (MOH 2017).
- Increased efforts have resulted in declines, albeit not substantial
- The threat of malaria remains, evidenced by frequent reports of upsurges
- No child should die of malaria; a preventable and curable disease.

HIGHLIGHTS

75%

Reporting rate

263,582

Confirmed Malaria Cases

16%

Districts had inadequate ACT stock

23

Malaria deaths

52

Districts are having malaria Upsurges

36%

Districts had inadequate RDT stock

58%

Test Positivity Rate

WHAT IS THE PROBLEM ? Deaths = Ears of the Hippo !!

5% of the problem revealed

- Death

95% of the problem hidden

- Cognitive impairment
- Learning disability
- Epilepsy
- Impaired growth
- Deplete HH income
- Under productivity
- Drains the economy
- Strains the health system
- Strains HCW
- Poverty
- Under development

Justification

- Vision 2040 targets include: reduce IMR to 4:1000 & < 5 mortality rate to 8:1000
- Reduction in malaria deaths is a prerequisite to attaining these targets
- GOU efforts heavily tilted to quantity; donor efforts good, but siloed.
- Local touch to solving local problems-key to long lasting success
- Using the Busoga sub-region as a case study we propose to develop a model HSS

Developing a model HSS to reduce malaria deaths

Phase	Goal		Specific objectives
I	Generate evidence	1	Identify the determinants of severe malaria in children
		2	Evaluate the capacity of health facilities in providing MCM
		3	Determine the quality of MCM services offered to patients at HC
		4	Assess HCW competencies in MCM at HC
		5	Provider and user perspectives of MCM services
II	Develop the model	1	Design of a model health systems strengthening strategy
		2	**Pilot the model: Proof of Concept**
III	Evaluation of the model	1	Evaluating the impact of the strategy on reducing malaria mortality

Factors associated with severe malaria

Category	Variable	Multivariate OR (95%CI), p-value
Care seeking types	**Delayed to seek appropriate care**	**5.50 (2.70, 11.1), p<0.001**
	Went to a drug shop as the 1st response	**3.62 (1.86, 7.03), p<0.001**
	Mother initial decision taker	**0.45 (0.24, 0.78), p<0.010**
Child factors	Danger symptoms on 1st day	4.58 (1.73, 12.1), p=0.002
	Gametocytemia	1.86 (1.05, 3.28), p=0.032
Caregiver	**Caretaker employed**	**3.10 (1.77, 5.45), p=0.015**
Head of home	Years of education	0.94 (0.87, 1.00), p=0.078
Home factors	**> 3 children in home**	**2.46 (1.20, 5.05), p=0.013**
	Distance in km to nearest HCIII [a]	**1.45 (1.17, 1.79), p<0.001**

[a] Adjusted analysis limited to 240 case-control pairs with available GPS data for respective household
Highest quartile of SES associated with increased risk of severe malaria

Factors associated with delayed care seeking

Variable	Multivariate[a] OR (95%CI), p-value
Initial response drug shop	**2.84 (1.12, 7.21), p=0.028**
Mother initial decision taker	0.63 (0.28, 1.41), p=0.266
Caretaker years of education	0.96 (0.88, 1.05), p=0.380
Caretaker in polygamous relationship	**2.35 (1.15, 4.80), p=0.018**
Head of household employed	0.45 (0.19, 1.06), p=0.081
Distance in km to nearest HCIII[b]	**1.18 (1.02, 1.37), p=0.031**

[a]Weighted logistic regression analysis to account for the biased representation of cases.
[b]Adjusted analysis limited to 240 case-control pairs with available GPS data for respective households

Why do caregivers delay ? COMMUNITY PERSPECTIVES

- **Caregiver tend to underrate initial symptoms of illness.**

*"The body may be hot but **not very** hot. The child may be playing and eating. We can say that let us give them **'some'coartem.'** They will get better."*

- **Convenience and procrastination**

*"The government hospital is **very far from our home** so we first go to the **pharmacy** and then when the **condition does not change** then we go to the **government hospital**."*

- **Drug shops are more convenient that public health facilities**

*"Yes, you need transport of 1500 **plus it is painful**……...You find that there are **no drugs**, **even panadol** they don't give you that is why we don't go. So you would use that money and go to the clinic."*

Why do caregivers delay ? PROVIDER PERSPECTIVES

P#1: (HCW; Level II PNFP; Been in service since 1981)

Why do children die of malaria in this place ?

"They usually buy some pain killers in drug shops, when they have failed to heal they run here"

P#3 (Drug shop attendant)

Interviewer: Do you stock IV Artesunate ?

Respondent: "No!"

Interviewer: How about IV Ceftriaxone

Respondent "That one we have !"

Provider capacity to provide malaria case management

Variable	All	Level			Owner		
		IV	III	II	GOU	PNFP	PFP
HCW characteristics							
Number of HC workers, n (%)	1718	219	709	790	1349	251	118
Know the 1st line R_X for UM, n (%)	1555 (90.5)	200 (91.3)	655 (92.4)	700 (88.6)	1237 (91.7)	227 (90.4)	**91 (77.1)**
Training MCM, n (%)	628 (36.6)	87 (39.7)	296 (41.7)	245 (31.0)	486 (36.0)	93 (37.0)	49 (41.5)
Health Facility characteristics							
Number of health facilities	392	16	101	275	285	76	31
Any malaria test available, n (%)	355 (90.6)	16 (100.0)	99 (98.0)	240 (87.2)	253 (88.8)	71 (93.4)	31 (100.0)
Any AL pack available, n(%)	300 (76.5)	**12 (75.0)**	88 (87.1)	**200 (72.7)**	**204 (71.6)**	71 (93.4)	25 (80.7)
% of vacancies filled, median (IQR)	56 (33, 78)	76 (70, 85)	79 (63, 95)	56 (33, 67)	66 (44, 79)	50 (33, 67)	55 (33, 67)

Malaria case management indicators among patients

Variable	All	Level			Owner		
		IV	III	II	GOU	PNFP	PFP
Number of patients	3936	363	1398	2175	3414	323	199
Malaria testing practic							
Testing rates, n (%)	3552 (90.2)	317 (87.3)	1330 (95.1)	1905 (87.6)	3128 (91.6)	290 (89.8)	134 (67.3)
Test positivity rate, n (%)	2106 (59.3)	191 (60.3)	715 (53.8)	1200 (63.0)	1894 (60.5)	139 (47.9)	73 (54.5)
Treatment practice							
AM prescribed to positives , n (%)	2094 (99.4)	190 (99.5)	704 (98.5)	1200 (100)	1886 (99.6)	136 (97.8)	72 (98.6)
AM prescribed to negatives , n (%)	25 (1.7)	1 (0.8)	9 (1.5)	15 (2.1)	22 (1.8)	3 (2.0)	0
Appropriate (App) MCM[1]							
App MCM; AL prescribed, n (%)	3419 (86.9)	301 (82.9)	1278 (91.4)	1820 (84.6)	3040 (89.1)	278 (86.1)	101 (50.7)
App MCM; ACT prescribed, n (%)	3464 (88.0)	306 (84.3)	1298 (92.9)	1860 (85.5)	3065 (89.8)	282 (87.3)	117 (58.8)
App MCM; AL given, n (%)	3034 (77.1)	230 (63.4)	1134 (81.1)	1670 (76.8)	2671 (78.2)	268 (82.9)	95 (47.7)
Patient sat. score[2], median (IQR)	8 (6, 9)	7 (6, 8)	8 (6, 9)	8 (7, 9)	8 (6, 9)	8 (7, 9)	9 (8, 10)

[1]App MCM[1]: Tested, if positive prescribed AL/ACT/given AL, if negative not given Antimalarial
[2]Patient satisfaction scored on a scale of 0 (Complete dissatisfaction) to 10 (Complete satisfaction)

Summary

1. **Adherence to malaria case management guidelines greatly improved**

2. **Health facility/provider gaps**
   - ➢Low testing rates HC IV & HC II
   - ➢Low testing rates Private sector
   - ➢Private sector: knowledge gap AL

3. **System gaps**
   - ➢Within district stock out of ACT and diagnostics (HC IV & II)
   - ➢Private sector challenges/regulation/conflic
   - ➢Inadequate supervision/oversight

4. **Community**
   - ➢Hyperbolic discounting
   - ➢A disengaged community
   - ➢CHW underutilised

Hyperbolic discounting *refers to the tendency to value immediate though smaller rewards more than long-term larger rewards*

Phase II: Model HSS strategy: proof of concept trial

Study design: Proof of concept trial (access feasibility, acceptability and preliminary evidence of impact)

Theory of change

- Our theory of change is premised on two interdependent conditions.
- First, providers must deliver high-quality healthcare services to the satisfaction of the community
- Second, target communities, consumers of services must utilize these services

Intervention approach

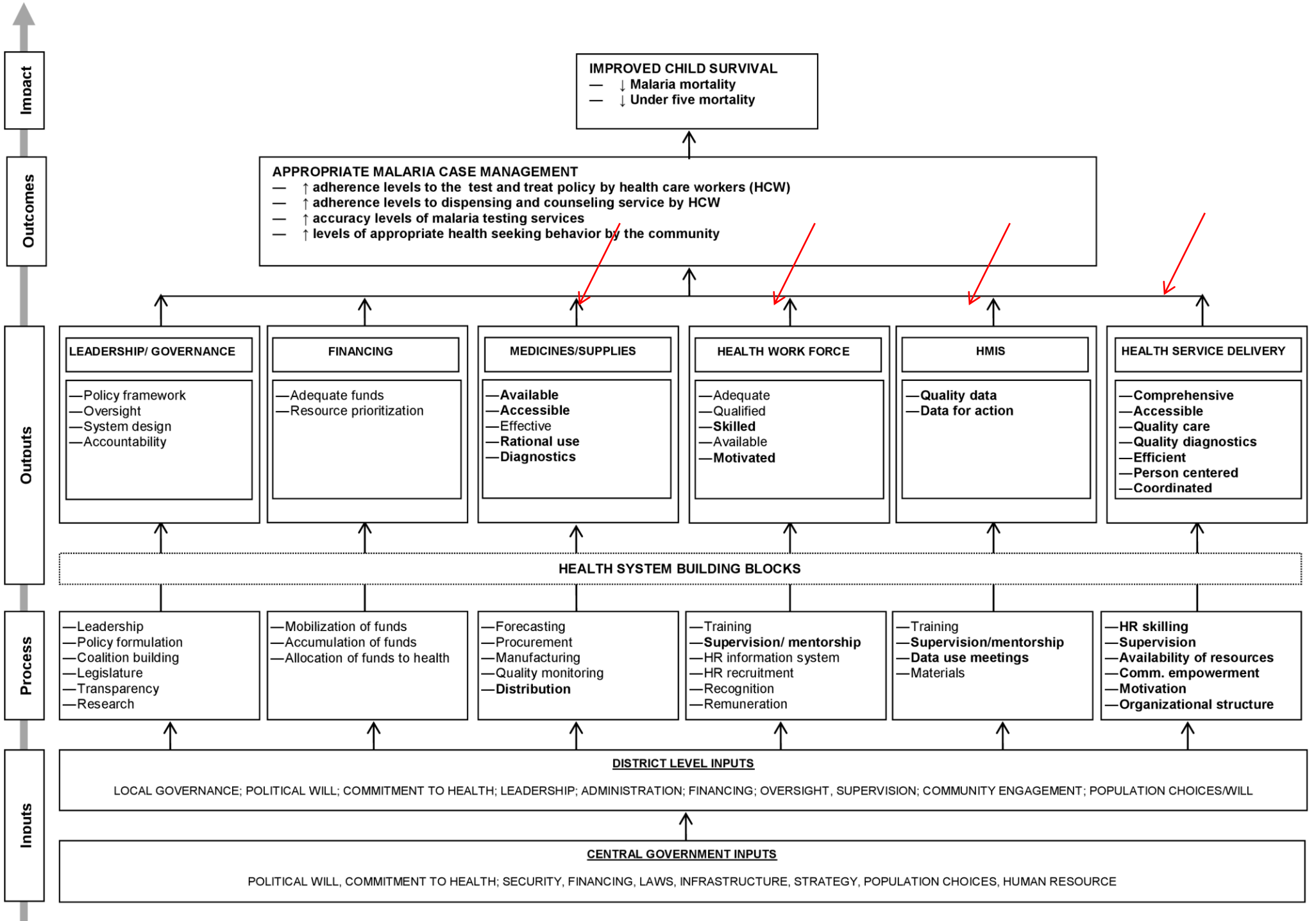
- Strengthen processes to achieve outputs in 4 priority building blocks of the HS
- Behaviour change campaigns to promote patient centred care and appropriate HSB

Intervention aim

- Delivery of high quality & attractive services by providers to the community
- Empowering communities to make healthy choices

Intervention intention target (intermediary goals)

- Narrow the gap between provider (supply) and community (demand)


Impact
Outcomes
Outputs
Process
Inputs
IMPROVED CHILD SURVIVAL
— ↓ Malaria mortality
— ↓ Under five mortality
APPROPRIATE MALARIA CASE MANAGEMENT
— ↑ adherence levels to the test and treat policy by health care workers (HCW)
— ↑ adherence levels to dispensing and counseling service by HCW
— ↑ accuracy levels of malaria testing services
— ↑ levels of appropriate health seeking behavior by the community
LEADERSHIP/ GOVERNANCE
—Policy framework
—Oversight
—System design
—Accountability
FINANCING
—Adequate funds
—Resource prioritization
MEDICINES/SUPPLIES
—Available
—Accessible
—Effective
—Rational use
—Diagnostics
HEALTH WORK FORCE
—Adequate
—Qualified
—Skilled
—Available
—Motivated
HMIS
—Quality data
—Data for action
HEALTH SERVICE DELIVERY
—Comprehensive
—Accessible
—Quality care
—Quality diagnostics
—Efficient
—Person centered
—Coordinated
HEALTH SYSTEM BUILDING BLOCKS
—Leadership
—Policy formulation
—Coalition building
—Legislature
—Transparency
—Research
—Mobilization of funds
—Accumulation of funds
—Allocation of funds to health
—Forecasting
—Procurement
—Manufacturing
—Quality monitoring
—Distribution
—Training
—Supervision/ mentorship
—HR information system
—HR recruitment
—Recognition
—Remuneration
—Training
—Supervision/mentorship
—Data use meetings
—Materials
—HR skilling
—Supervision
—Availability of resources
—Comm. empowerment
—Motivation
—Organizational structure
DISTRICT LEVEL INPUTS
LOCAL GOVERNANCE; POLITICAL WILL; COMMITMENT TO HEALTH; LEADERSHIP; ADMINISTRATION; FINANCING; OVERSIGHT, SUPERVISION; COMMUNITY ENGAGEMENT; POPULATION CHOICES/WILL
CENTRAL GOVERNMENT INPUTS
POLITICAL WILL, COMMITMENT TO HEALTH; SECURITY, FINANCING, LAWS, INFRASTRUCTURE, STRATEGY, POPULATION CHOICES, HUMAN RESOURCE

Study setting: Busoga sub-region

Geographical scope

—Bunya East HSD Mayuge District

— Had low performance indicators during assessment

— Comprised of SC (4) Parishes (7) Villages (31)

— HC IV (1) HC III (1) HC II (15)

— Population Size (121,693)

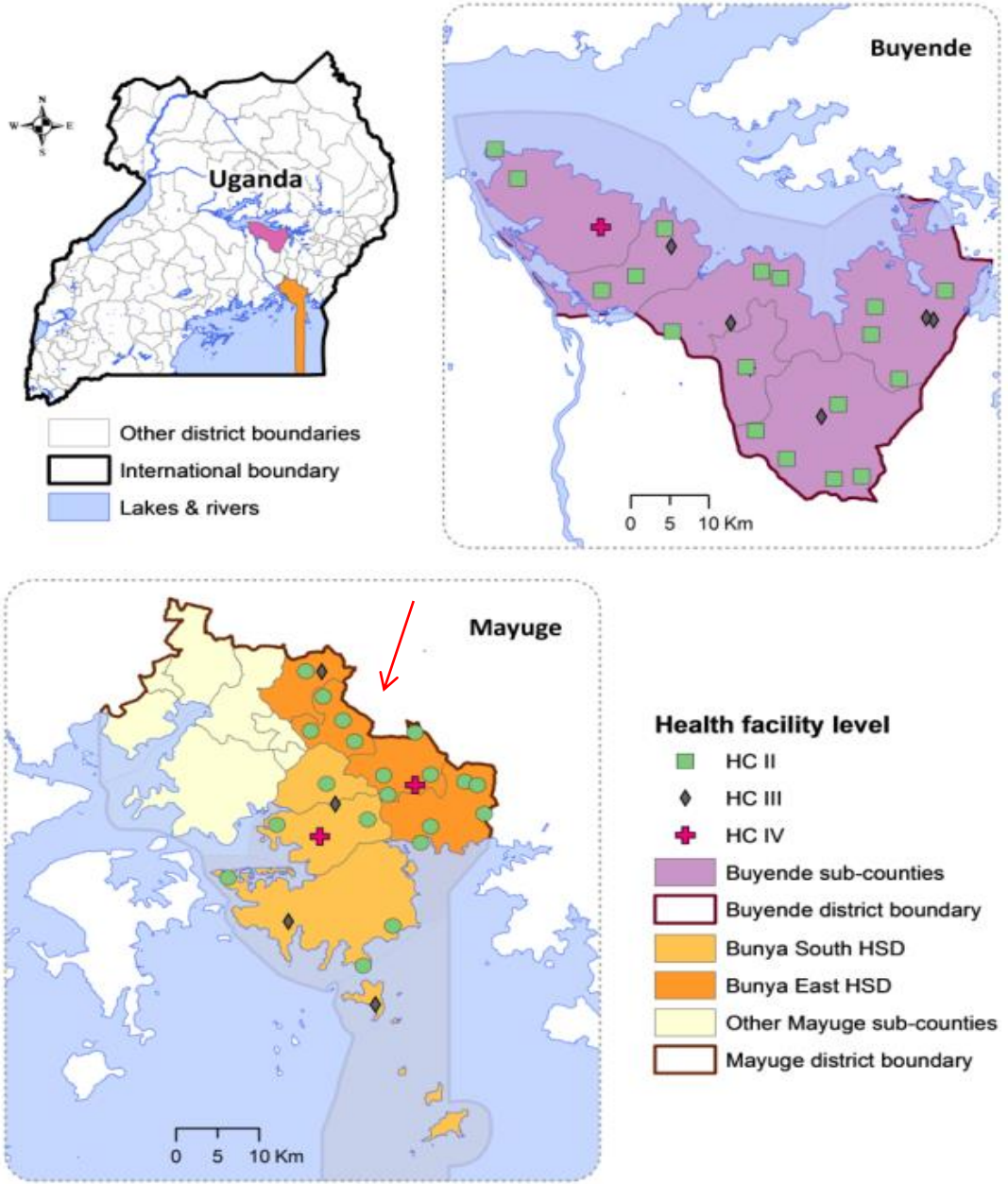
Scope of work

— HF interventions Interventions will target

- All public facilities in the HSD
- Registered Drug shops ?

— Community based interventions

- Limited to 2 villages in the HSD.



The intervention: THREE PRONGED APPROACH

1. **THEMATIC AREA 1: DELIVERING HIGH QUALITY SERVICES**
2. **THEMATIC AREA 2: COMMUNITY ENGAGEMENT & EMPOWERMENT**
3. **THEMATIC AREA 3: STRENGTHENED VILLAGE HEALTH TEAMS (VHT)**

Design of intervention premised on:

- **Priority problems**
- **Projected effectiveness**
- **Resources required to implement**

Premised on these criteria, interventions

- high ranking interventions of projected high impact were formulated
- low cost and sustainable

The intervention: design

Barrier and associated interventions ranked based on two criteria

1. **Projected effectiveness**
2. **Resources required to implement**

Premised on these criteria, constituted interventions have the following qualities

1. **High ranking interventions of projected high impact**
2. **Low cost and sustainable**

THEMATIC AREA 1: HIGH QUALITY SERVICES

Focus Area	Problem	Intervention	Outcome
1. Patient centred care	—Long waiting times —Unfriendly HCW	**Training, mentorship, & supervision** —Values of PCS among HCWs —Communication & Respect —Restructuring patient flow —Reviewing opening hours	—Reduce patient waiting time —Community appreciative services
2. Availability of AL/RDT	— Stock outs	**Mentorship & supervision** — Supervisory oversight for requisitions — Strengthen AL & RDT redistribution	—Reduced stock out of AL & RDTs
	—Inaccurate tests	**Training, mentorship, & supervision** —Malaria testing (Microscopy & RDT) —Malaria testing QA/QC system	—Improved accuracy of test results
3. MCM	—Non adherence	**Training , mentorship, & supervision** —Malaria case management —Treatment adherence counselling **Supply of guidelines and algorithms** —UCG & IMM guidelines	—**High levels of HCW adherence to:** —Test and treat policy —Correct dosing Of antimalarials —Dispensing & counseling guidelines
4. HMIS data quality	—Low reporting rates —Inaccurate data —Limited use of data	—Develop guidelines on HMIS data use —Routine DQA at the HSD —Build local analytical skills —malaria on the agenda	—Accurate HMIS data —Use of data to inform decisions

THEMATIC AREA 2: COMMUNITY ENGAGEMENT & EMPOWERMENT

Focus Area	Problem	Intervention	Outcome
		Community engagement —community dialogues —Understand choices &reasons —Ranking exercise —Bracketing gap	—Co-designed SBCC strategies
1. Empowering homes	—↓ uptake of preventive strategies —Negative attitudes towards providers —Delayed care seeking —Care seeking from unqualified providers —Undermining initial symptoms of malaria	—Health promotion campaigns	—uptake of preventive strategies —Prompt care seeking — Appropriate care seeking
		—Local media campaign	

THEMATIC AREA 3: COMMUNITY ENGAGEMENT & EMPOWERMENT

Focus Area	Problem	Intervention	Outcome
1. CHW	—Underutilised —Knowledge gap —Lack of medicines and RDTs	**Training , mentorship, & supervision** —Training —Evaluation of fever —Evaluation of danger signs + referral —Strengthen and support: Test and Treat —Strengthen: ICCM —Oversight of vulnerable homes —Promoting appropriate HSB	—Increased testing and treatment —Prompt care seeking for febrile illness —Care seeking from qualified providers

Evaluation : Cross sectional surveys before and after the intervention

1. **Community cross surveys**
   - Utilization of ITNs
   - Response types to febrile illness
   - Health care seeking choices for febrile illness in children

2. **Health facility surveys**
   - Availability of essential commodities related to malaria control
   - Availability of materials and resources relevant to malaria control

3. **Health care worker (HCW) survey**
   - HCW knowledge to malaria case management practice
   - Levels of supervision in malaria case management

4. **Patient exit interviews**
   - Appropriateness of malaria case management services
   - Timeliness of response to illness by the community
   - Patient satisfaction with service
   - Accuracy of malaria testing services

Challenges

1. Scope of work

2. Inability to address overarching health system challenges (salary, staffing levels, underfunding)

3. Evaluating impact of intervention
   - Duration of intervention limited
   - Contamination by other interventions
   - Defining the catchment area of health facilities difficult

Timelines

1. **Proposal development: Feb 2022**
2. **Proposal submission and IRB approvals: On-going**
3. **Baseline surveys: Aug/Sept 2022**
4. **Intervention implementation: Oct 2022 to Nov 2023**
5. **Post intervention Survey: Oct 2023**

THE END

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- MAK RIF

- Study participants
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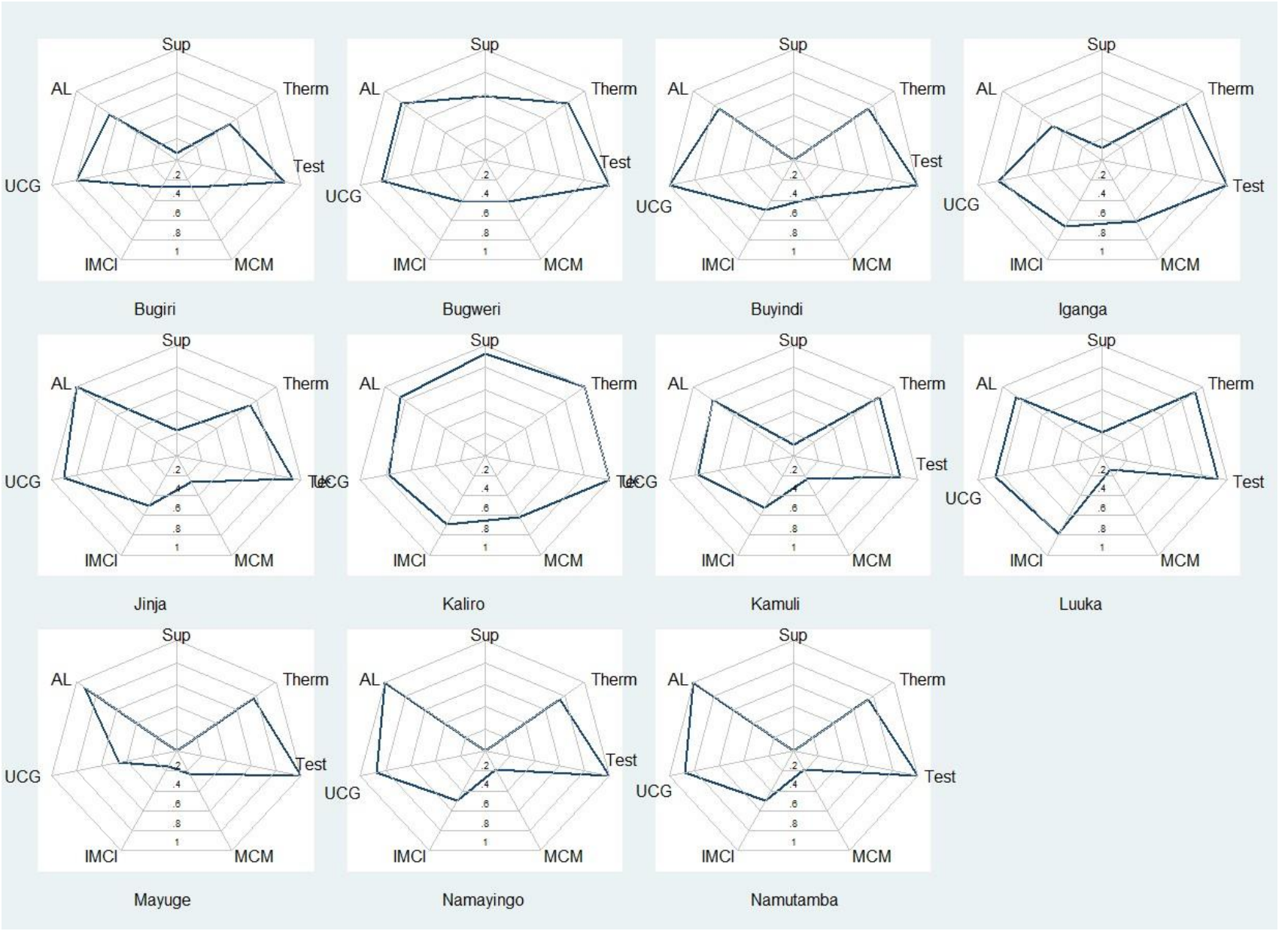
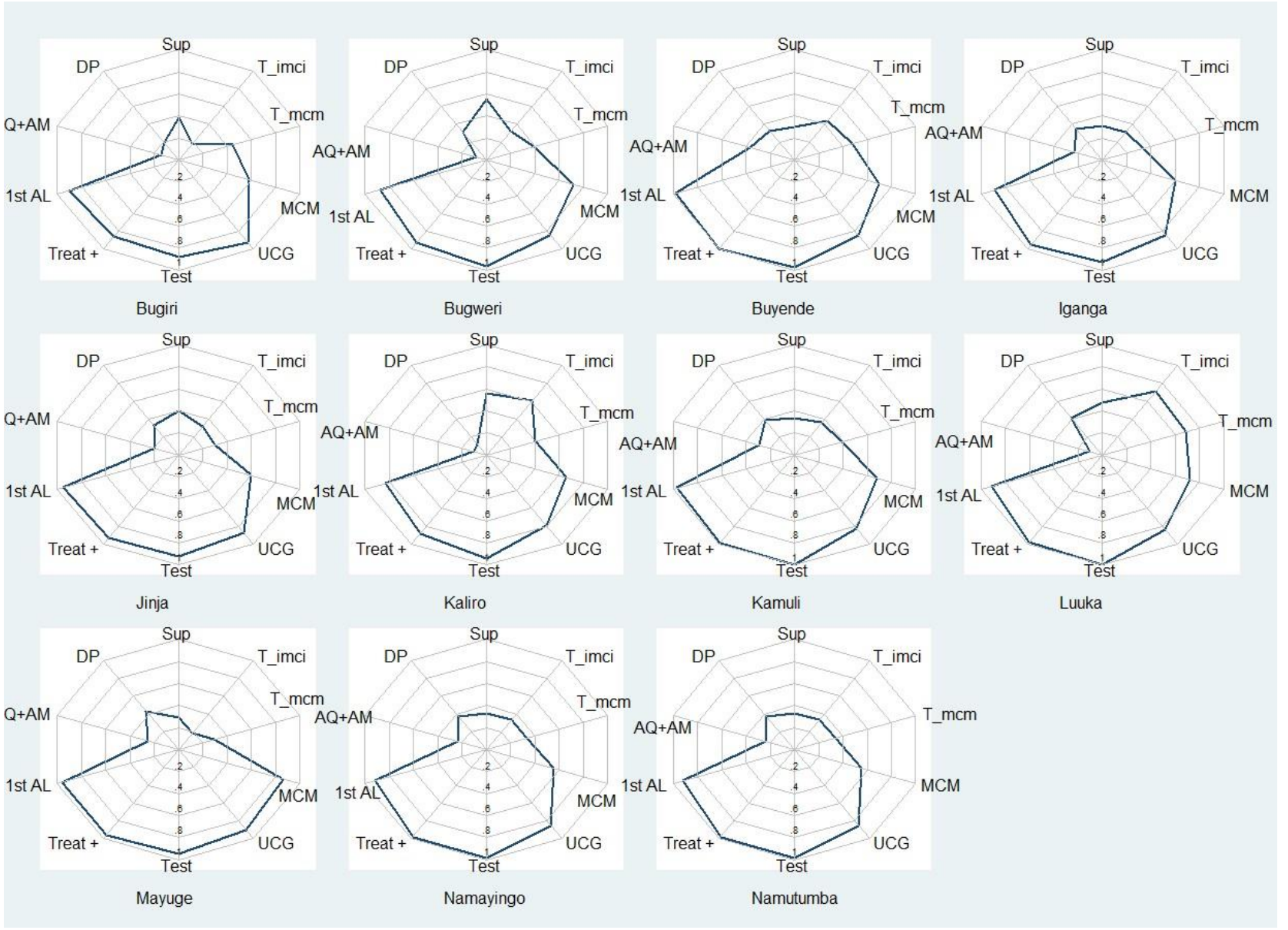
- Study team (Yasin, Jesica, Rose, Lucy, etc)
- PAC Team (Drs Sarah Byakika, A. , P. Nantamu, G. Bayenda, A. Tagoola, A, Balyeku)

HFA performance indicators malaria case management: district



HCW performance indicators malaria case management: district



Performance indicators for malaria case management: 11 Busoga districts