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**Zambia Integrated Systems
Strengthening Program**

Health Facility Technology and Data Collection Systems Audit

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Health Facility Technology and Data Collection Systems Audit

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Abbreviations/Acronyms

ACD	Active Case Detection
ACS	Active Case Surveillance
DHIO	District Health Information Officer
DHIS	District Health Information System
DHMT	District Health Management Team
DHO	District Health Office
EA	Environmental Assessment
MOH	Ministry of Health
NMCP	National Malaria Control Program
OPD	Outpatient Department
PERSUAP	Pesticide Evaluation Report and Safe Use Action Plan
PPE	Personal Protective Equipment
IT	Information Technology
ZISSP	Zambia Integrated Systems Strengthening Program

I. Introduction & Purpose

The Ministry of Health (MOH) through the National Malaria Control Program (NMCP) has noted the isolation of current data generation and collection. This data is critical to planning and monitoring of program targets, particularly those data generated from partner efforts. The lack of integrated collection and analysis of data among partners presents a tremendous hindrance to strategic planning, resource allocation and impact tracking. In some instances, data is crucially truncated or altogether absent. The best example is entomological data. In addition, there is a tremendous need to increase dialogue between data analysts and operational strategists in order to encourage data-driven decision making.

The introduction of information technologies will often assist in the resolution of data incompleteness or lack of integration particularly if contributing factors are resource constraints (i.e., limited time or human resources) and the existence of resource-hungry systems or processes. These issues are present in Lusaka district health facilities where human resources are inadequate, and each facility is required to hand-tally upwards of twenty-seven registers per month. In a dense urban environment like Lusaka, clinicians can fill upwards of one or two outpatient departments (OPD) per month but may not be able to fill in all the 26 register types.

With this context, initiatives must be sensitive when introducing new processes or systems. Human resources per facility are strained and therefore a net increase in resource requirements associated with one reporting framework will suffer the remaining reporting requirements proportionately or vice versa. This has specific relevance to Zambia Integrated Systems Strengthening Program (ZISSP) as the program works with the NMCP and the Lusaka District Health Management Team (DHMT) to launch active case surveillance (ACS) and active case detection (ACD) activities in selected Lusaka district health facilities. In addition, any technological advances introduced must be plausible and fit within the technological capacity of facilities or districts.

These two constraints, human resources and technological capacity, delimit the boundaries for sustainable information technology (IT) solutions. Some IT solutions may be better than others, but if these cannot be maintained by facilities or, on account of training requirements, result in an increase on the human resource burden, they will be deemed inappropriate. Likewise, if the reporting frameworks required to implement ACS in select Lusaka district health facilities become a burden on the human resource, an alternate strategy should be determined.

The solution must effectively use current reporting systems to integrate isolated databases and bolster linkages between decision makers and analysts. Furthermore, the solution must assist stakeholders by collecting the selected M&E indicators to meet current reporting requirements.

To clearly articulate the practical shape of these criteria in Lusaka district facilities, Akros representatives conducted a short technological and systems audit.

2. Methods

Akros representatives visited eleven separate health facilities in Lusaka District to review technological capacity and data collection systems, along with generally approximating the total human resource burden and to review clinic registers and logbooks. The facilities visited were Chelstone, Chainda, Mtendere, Chilenje, Prisons, Airport, Chainama, Matero Reference, Kamwala, Kabwata and Kalingalinga. Informal interviews were conducted and observations recorded about the technological capacity of each facility. Lusaka DHIOs (district health information officers) were consulted as to the timeliness and completeness of data reporting (another indicator of human resource strain). Several Stakeholders were informally consulted to determine the same

3. Findings and Discussion

3.1 Technology

Very few facilities have computers readily available, and these are rarely used for reporting or data collection within the HMIS framework. As computers are nearly non-existent in facilities, all HMIS data collection and aggregation is done by hand (with the exception of some MOH partner supported projects). Every one of the 27 registers required of each facility must be delivered to the Lusaka District Health Office (DHO) in written form (see Appendix A for examples). Thereafter, data sheets are aggregated electronically in local, non-networked installations of DHIS (district health information system) at the DHO. Despite the Internet connectivity in Lusaka urban being better than most rural facilities, it is generally poor. This inhibits electronic transfer of files and must be hedged, if a new solution is to be introduced, by retaining physical transfer protocols such as those that currently exist between facilities and the Lusaka DHO.

Most clinic professionals own cellular phones, and many of these are J2ME enabled devices (for a rather exhaustive list of these, see http://www.club-java.com/TastePhone/J2ME/MIDP_mobile.jsp).

3.2 Data Collection

Data collection systems at the clinic level are sufficient in principle, but often suffer practical setbacks. For example, outpatient data collection systems generally begin at the screening room, where suspected case information is recorded on a tally sheet. This is so especially in clinics with a high patient case load where multiple screening rooms must be used. Lab work, if necessary, is performed and recorded on lab registers, after which the results are issued to clinicians and a final diagnosis is made. The diagnosis and treatment information are recorded in the outpatient register at the conclusion of the patient visit. We find, however, that screening room tally sheets are often inconsistent with outpatient registers. In addition, lab registers often do not represent the sum total of screened patients referred to the lab, nor do they concur with totals generated from the outpatient registers. The number of prescribed anti-

malaria cases in Lusaka district far exceed the number of confirmed and clinical malaria cases. In a few instances, clinicians are considering a case 'confirmed' if an anti-malarial is prescribed (see Appendix B). For others, diagnostic confirmation is lab determined. In many cases, a clinician will treat a patient with anti-malarials regardless of the laboratory result (see Appendix C). For some facilities, one instance of malaria would be considered both suspected and confirmed; for others, the categories are mutually exclusive (see Appendix D).

These discrepancies complicate the process of quantifying the epidemiology of malaria and determining appropriate intervention responses in scale and scope. Through interviewing key informants including DHIOs, clinic in-charges, laboratory technicians and data specialists at clinic level, we identified a few causal factors to these problems:

- **Inadequate training:** Provincial and district officers have limited training budgets. In 2009, Lusaka Province conducted only one training with DHIOs, even less in prior periods. Lusaka Province DHIOs also have limited resources to conduct training with facility personnel, and this leads to inconsistent understanding of HMIS definitions. Across the multiple facilities visited, each had unique case definitions for critical HMIS indicators such as 'Confirmed Malaria' and 'Clinical Malaria'.
- **High turnover:** High personnel turnover further perpetuates the above inconsistencies. With no consistent training regimen reinforced from provincial or district personnel, new hires often lack understanding of HMIS field definitions.
- **Lack of consistent communication between laboratory personnel and clinicians.** Clinicians may treat a patient with anti-malarials regardless of laboratory diagnostic results.

IRS involves use of insecticide which may be hazardous to any personnel that are involved in the transport, storage, usage, cleanup, or disposal of the insecticide or its resultant waste. As a result of these hazards, the US Government has established regulations governing the use of pesticides both domestically and in aid programs outside of the United States. Under USAID international programs, the major relevant regulation is US 22 CFR 216, which mandates the development of a Pesticide Evaluation Report and Safe Use Action Plan (PERSUAP) prior to the provision of direct or indirect support for the purchase or use of pesticides. For the ZISSP program, a PERSUAP has been developed as part of the 2009 Supplementary Environmental Assessment (EA).

To assure safety and prevent environmental contamination in IRS, it is important that appropriate procedures are in place for safe handling and storage of insecticides, that the proper training is conducted prior to the commencement of pesticide activities, and that there are appropriate resources available, including adequate storage facilities and personal protective equipment (PPE) for all personnel who may come in contact with insecticide at any of the above stages. These requirements are spelled out in this Environmental Mitigation and Monitoring Report.

4. Next Steps

These discoveries will inform a number of Akros tasks going forward:

- ACS system design: Initial plans involved creating new facility-based data capture forms for individual patients diagnostically confirmed with malaria. This will need reconsideration. Efforts will be made to glean these data from existing OPD, IPD and laboratory records in each facility, and provide informal and consistent training to facility staff through the pilot program.
- Harmonization of intervention monitoring, entomological surveillance and case surveillance databases: These efforts will be based at the district level, where the problems noted above are less severe. The district, however, remains burdened, thus these efforts will need to focus on developing existing resources instead of creating new systems. Preliminary discussions are directed toward utilizing the current HMIS framework as a focal point for these data.
- Data management training: Akros will collaborate with other MOH partner institutions to strengthen HMIS training efforts at the district and provincial levels. The Malaria Control and Evaluation Partnership for Africa (MACEPA) and Malaria Consortium (MC) both support provincial-level HMIS trainings targeted to DHIOs. Akros will seek to incorporate data management and integration proposals into these forums to help circumvent problematic discrepancies in data management techniques between facilities.

5. Conclusions

Lusaka District facilities have overburdened human resources. Existing reporting requirements often exceed the capacity of facility personnel, and HMIS data quality and consistency suffer accordingly. Akros has been assigned tasks that are integrated with HMIS and other reporting mechanisms: ACS and ACD, and the integration of resulting data with intervention, entomological and spatial databases. As Akros proceeds with these tasks, caution must be exercised to impose minimal strain upon human resources and to stay within the technological capacities of target facilities. Specific strategies will be formulated in the future but preliminary discussions have proposed the usage of existing facility reporting forms for ACS monitoring (i.e., Lusaka Weekly Report Form, RDT Register), developing integrated databases within the current DHIS framework (i.e., added modules within DHIS 1.4 or 2.0), and limiting SMS-based reporting technologies to those compatible with phones already present in Lusaka District facilities (i.e., only those technologies compatible with J2ME enabled phones).

6. Appendix A – Examples of Facility Data Capture Forms

These are a few of the registers each health facility is required to complete. There are at least 27 in total. Each are completed by hand and couriered to respective district offices, where totals are aggregated by hand, then entered into DHIS 1.4.

Illustration I: HIAI Form, Page I

Health Centre Disease Aggregation Form HIAI

District: _____ Month: _____
 Health Institution: _____ Year: _____

DIAGNOSES	OPD First Attendance				IPD Discharge				Deaths			
	under 1 year	1 to under 5 years	5 years and over	total	under 1 year	1 to under 5 years	5 years and over	total	under 1 year	1 to under 5 years	5 years and over	total
NOTIFIABLE DISEASES												
Acute flaccid paralysis (suspected poliomyelitis)												
Cholera												
Measles												
Meningitis												
Neonatal tetanus												
Plague												
Rabies												
Dysentery												
Typhoid fever												
Yellow fever												
Any other unusual occurrence of disease or outbreak												
SELECTED DISEASES												
Malaria												
Clinical case of malaria												
Confirmed case of malaria												
Clinical malaria in pregnancy												
Confirmed malaria in pregnancy												
ENT												
Ear Diseases												
Nose Diseases												
Throat Diseases												
Chronic Diseases												
Asthma												
Cardio-vascular diseases												
Diabetes												
Hypertension												
Nervous System Disorders: Epilepsy												
Sickle Cell Anaemia												
Retroviral Diseases (RVD)												
Cryptococcal meningitis												
Herpes zoster												
Kaposi sarcoma												
Pneumocystic Carii Pneumonia (PCP)												
Other diseases												
Anaemia												
Dental Caries												
Dental diseases: Other												
Diarrhoea (non-bloody)												
Digestive system: (not infectious)												
Eye Disease: Glaucoma												
Eye Disease: Refractory Errors												
Eye Disease: Spring Cattarah												
Eye diseases (infectious)												
Genital-Urinary diseases (except STI)												
Intestinal worms												

Illustration 2: HIAI Form, Page 2

Health Centre Disease Aggregation Form HIAI

District: _____ Month: _____
 Health Institution: _____ Year: _____

DIAGNOSES	OPD Final Attendance				IPD Discharge				Deaths			
	under 1 year	1 to under 5 years	5 years and over	total	under 1 year	1 to under 5 years	5 years and over	total	under 1 year	1 to under 5 years	5 years and over	total
	Mental Health (Neurosis)	286										
Mental Health (Psychosis)	287											
Muscular skeletal and connective tissue (not trauma)	212											
Neoplasms (All types)	215											
Nervous System Disorders, Other	240											
Polio	281											
Pulmonary diseases (not infectious)	280											
Pyrexia of Unknown Origin (PUO)	288											
Respiratory infection: non-pneumonia	2100											
Respiratory infection: pneumonia	2100											
Severe Diarrhoea with dehydration	2110											
Severe malnutrition (new cases)	2110											
Skin Diseases (not infectious)	2120											
Skin Diseases (infectious)	2120											
Snake Bite	2130											
Substance Abuse	2130											
TB	2140											
Trauma: Injuries, Wounds, Burns	2140											
TOTAL DIAGNOSES												

DIAGNOSES	Treated											
	0 to 14 years			15 to 24 years			25 years and above			Grand Total		
	M	F	total	M	F	total	M	F	total	M	F	total
Sexually transmitted diseases												
Genital ulcer	ST105											
Genital warts	ST110											
Inguinal bubo	ST115											
Male Urethritis Syndrome	ST120											
Pelvic Inflammatory Disease	ST125											
STI partner notification slips issued	ST130											
STI partner treated (new case)	ST135											
Obstetric Complications												
Delivery Complications - sepsis	OBS05											
Pregnancy Complications - abortion	OBS10											
Screening												
Woman newly diagnosed with breast cancer	CNS05											
Woman newly diagnosed with cervical cancer	CNS10											

Illustration 3: Weekly Report Form

Ministry of Health
Health Centre Weekly Situation Report

Name of Health Centre: _____
 Week No. _____ Reporting Period ____/____/____ = ____/____/____

No.	Case reported	Suspected	Tested	Confirmed	Comments /Observations Include dates of index case and last case
1	AFP				
2	Cholera				
3	Diphtheria				
4	Measles				
5	NNT				
6	Tetanus				
7	HIV/AIDS				
8	Dysentery				
9	Viral Haemorrhagic fever				
10	Malaria				
11	Meningitis				
12	Plaque				
13	Rabies				
14	Pneumonia				
15	TB – Suspect				
16	New smear positive				
17	Bilharzia				
18	Typhoid Fever				
19	Yellow Fever				
20	H1N1				

DRUG STOCKS				
No.	Case reported	Out of stock	In- stock	Observations
1	Coartem			
2	Quinine			
3	Penicillin			
4	Amoxicillin			
5	Co-trimoxazole			
6	Anti-tuberculosis			

Illustration 4: Monthly Summary Sheet for Child Health, Page I

Zambia Integrated Monthly Summary Sheet for Child Health

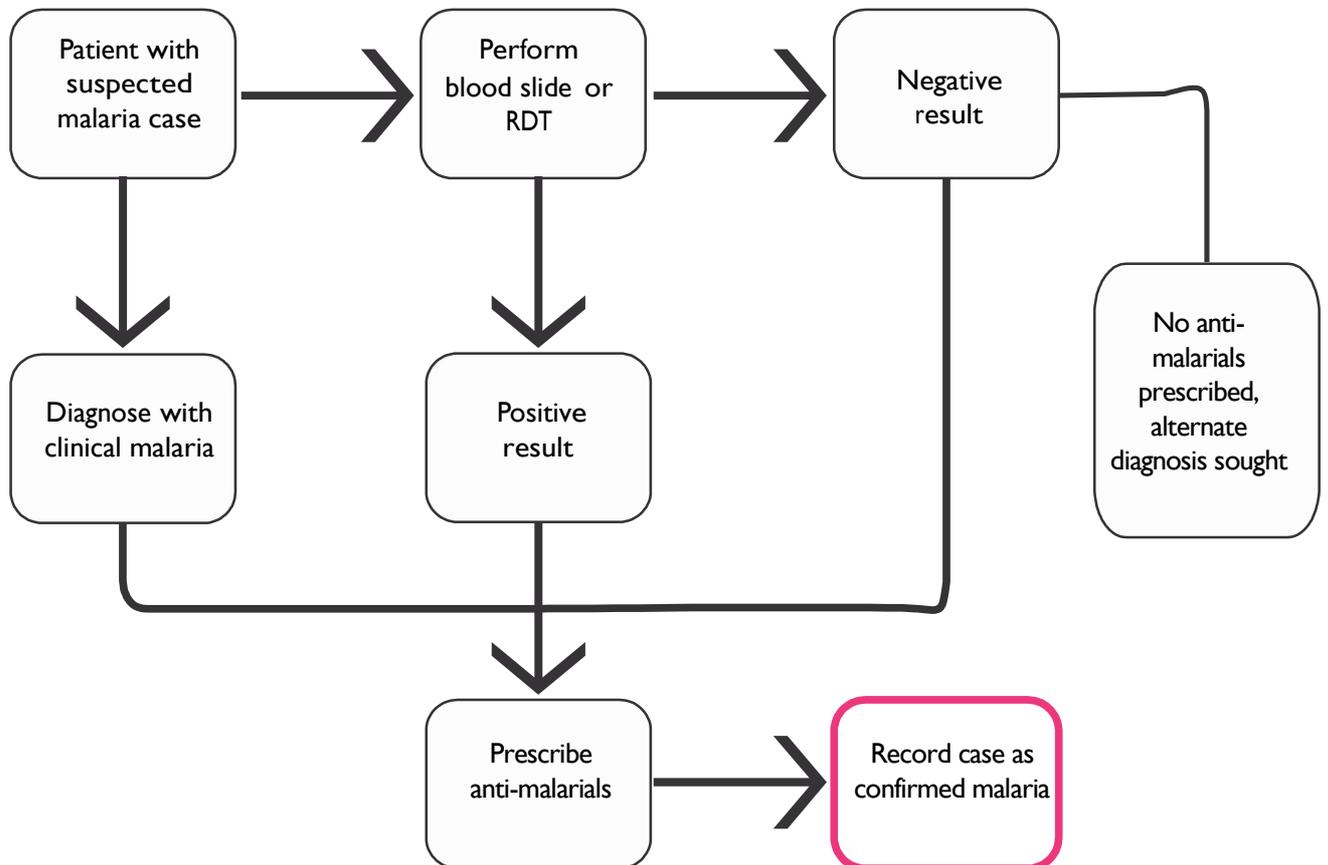
Province: Lusaka District: Lusaka Period: 1st Sept to 30th Sept 2009
 Health Facility: Kame

Item	Static			Outreach			Total		
	0 - 11 Months (* 1 year only)	12 - 59 Months	Total	0 - 11 Months (* 1 year only)	12 - 59 Months	Total	0 - 11 Months (* 1 year only)	12 - 59 Months	Total
New born protected at birth (PAB) from Tetanus	160		160						160
Vaccination, ITN, Fever, Diarrhoea, ORT, Breastfeeding									
BCG	100		100						100
OPV 0 (0-13 days only)	40		40						40
DPT-HepB+Hib 1	230		230						230
DPT-HepB+Hib 2	160		160						160
DPT-HepB+Hib 3	200		200						200
Fever the last 2 weeks If fever, received appropriate TRT within 24 hrs of onset									
Diarrhoea the last 2 weeks If diarrhoea, approp. ORT given									
Exclusive Breastfeeding now									
OPV 1	240		240						240
OPV 2	233		233						233
OPV 3	210		210						210
Measles	151		151						151
Slept under ITN last night									
Fever the last 2 weeks If fever, received appropriate TRT within 24 hrs of onset	10		10						
Diarrhoea the last 2 weeks If diarrhoea, approp. ORT given	09		09						
Exclusive Breastfeeding (up until 6 mths)	200		200						
Fully Immunized Child (OPV 4)	151		151						151
	37		37						37
Growth Monitoring, Deworming, Vit A									
Weight above 2nd line									
Weight between 2nd & dotted line	10		10						
Weight below dotted line	10		10						100
De-worming 12-59 mths only	4		4						45
Vit A 0 - 5 mths (if NOT on breastfeeding)									45
Vit A 6 - 11 mths (100,000 IU)	4		4						
Vit A 12 - 59 mths (200,000 IU)	4		4						
TT and Antenatal Care									
Pregnant women									
	Static		Total	Outreach		Total	WCBA 15 - 49 Years - Not Pregnant		
TT 1	09		09				Static	Outreach	Total
TT 2	48		48						
TT 3	44		44						
TT 4	50		50						
TT 5	40		40						
Already completed 5 T.T. doses									
ANC 1st visit	257		257						
IPT 1st Dose	132		132						
IPT 2nd Dose	43		43						
Slept under ITN last night, 2nd ANC visit									
IPT 3rd Dose	43		43						
Postnatal Care / Family Planning									
Postnatal									
Vit A to lactating mothers < 2 mths delivery	50		50				Other WCBA 15 - 49 Years		
New Family Planning Acceptors	63		63						

$\frac{151}{234} \times 100 = 65\%$
 Name of Reporting Officer: Betty Banda Date: 6/10/09
 Attended: 1,748 Male: 7252 Female: 7257
 Fully Immunized: 151 Male: 621 Female: 618

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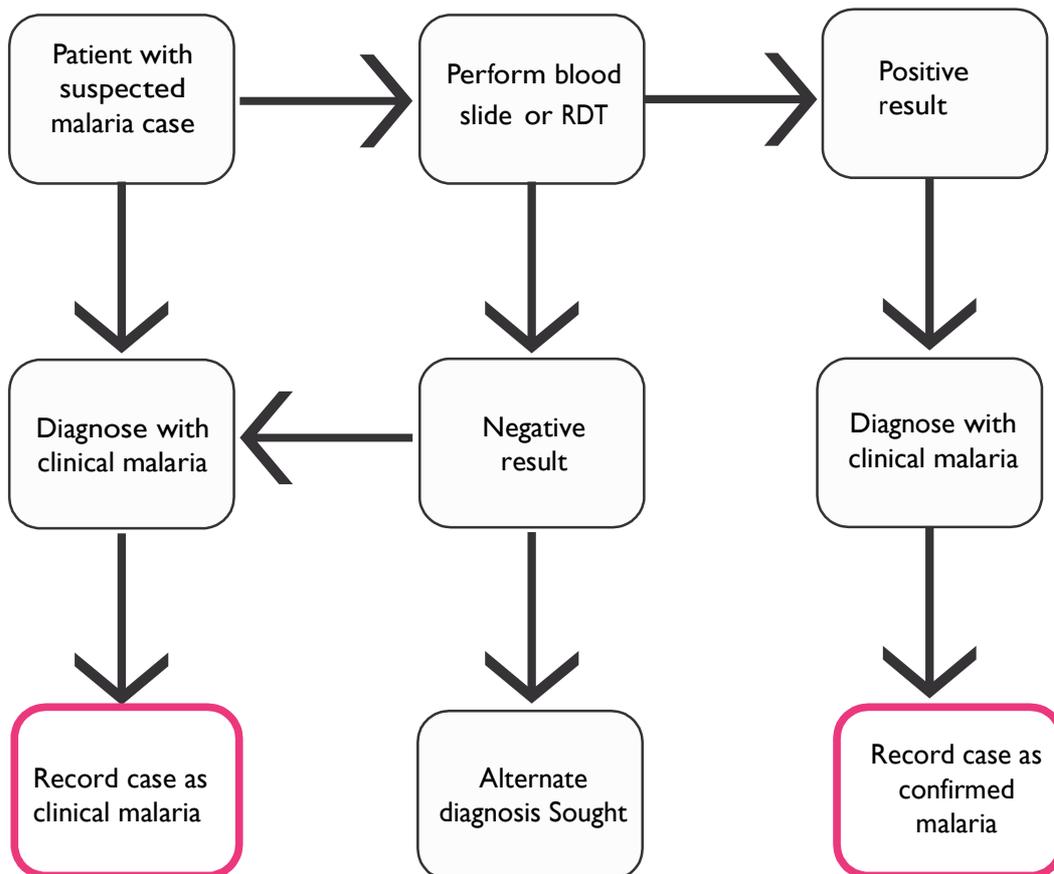
7. Appendix B - Process analysis - Prescription-based definition of confirmed malaria



This process analysis illustrates the conditions under which select facilities might record a malaria case as confirmed. The only true precondition is the prescription of anti-malarials. This poses unique problems for epidemiological analysis: both positive and negative laboratory results may be confirmed, along with clinical cases having no laboratory confirmation at all. There is further confusion when differentiating clinical malaria within this framework. By definition, all cases of malaria that are not laboratory confirmed are clinical, however since most cases of malaria,

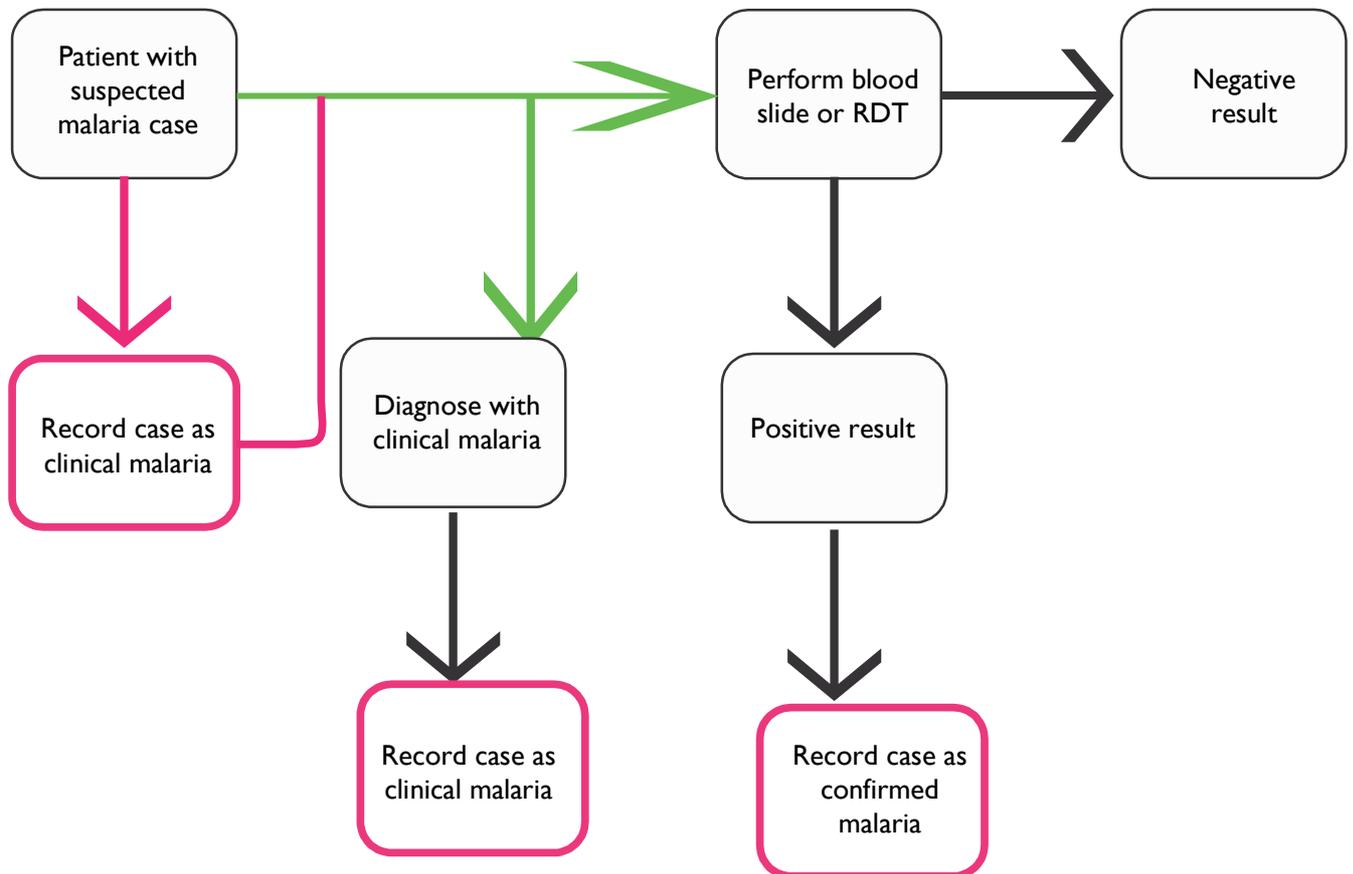
Lab-confirmed or not, will receive treatment, the prescription-based definition of confirmed malaria nearly eliminates this distinction. It should also be noted that clinic-laboratory relations can be stronger in all Lusaka laboratories. As noted in the schematic above, clinicians often prescribe antimalarial treatment when laboratory results are negative. Various aspects of this process were observed in at least six Lusaka District health facilities.

8. Appendix C – Process Analysis, Laboratory-based Definition of Confirmed Malaria



This process analysis illustrates the conditions under which select facilities might record a malaria case as confirmed or clinical. Post-diagnostic treatment decisions do not affect the case definition. This allows for a more meaningful distinction between clinical malaria - in this instance, a diagnosis in absence of laboratory involvement - and confirmed malaria.

9. Appendix D – Process Analysis, Suspected and Clinical or Confirmed Malaria



This process analysis illustrates the conditions under which select facilities might record a malaria case as suspected, confirmed/clinical or both. Some clinicians view the categories as mutually exclusive, i.e., a case that is confirmed or clinical may not also be suspected. In this instance, when a case is laboratory confirmed or clinically diagnosed, it is removed from the suspected category. Others view the categories as complementary: all confirmed or clinical cases of malaria will begin as, and thus simultaneously belong to, the suspected type. In this instance, and when auditing HIAI registers, one would expect the number of clinical and laboratory-tested cases of malaria (both positive and negative) to equal the total number of suspected cases

In any case, data from either method are valuable and epidemiologically significant, but some standardization of these categories should be created among facilities so that larger district or provincial trends among these data might be scrutinized.