1 **Effective management of district-level malaria control and elimination: Implementing quality**
2 **and participative process improvements**
3
4 Leadership and Engagement for improved Accountability and Delivery of Services Framework
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Abstract

45

46　Although it is widely recognized that strong program management is essential to achieving

47　better health outcomes, this priority is not recognized in malaria programmatic practices.

48　Increased management precision offers the opportunity to improve the effectiveness of malaria

49　interventions, overcoming operational barriers to intervention coverage and accelerating the

50　path to elimination. Here we propose a combined approach involving quality improvement,

51　quality management, and participative process improvement, which we refer to as Combined

52　Quality and Process Improvement (CQPI), to improve upon malaria program management. We

53　draw on evidence from other areas of public health, as well as pilot implementation studies in

54　Eswatini, Namibia and Zimbabwe to support the proposal. Summaries of the methodological

55　approaches employed in the pilot studies, overview of activities and an outline of lessons

56　learned from the implementation of CQPI are provided. Our findings suggest that a malaria

57　management strategy that prioritizes quality and participative process improvements at the

58　district-level can strengthen teamwork and communication while enabling the empowerment

59　of subnational staff to solve service delivery challenges. Despite the promise of CQPI, however,

60　policy makers and donors are not aware of its potential. Investments are therefore needed to

61　allow CQPI to come to fruition.

62

Background

Operational issues such as delivery and management are major challenges across health systems worldwide.[1] Although these challenges compromise the efficiency and effectiveness of health systems, often preventing those in need from accessing quality care, program management is perhaps one of the most neglected areas in public health. This is especially true for malaria, with strong program management being an essential component for malaria control and elimination and eradication[2].

Delivery is especially important for malaria, as the most important interventions are based on the distribution of vector control interventions into affected communities, such as long-lasting insecticide-treated bed nets or indoor residual spraying of insecticides to the walls of houses.[3] The delivery of these interventions is rife with operational challenges, as is the provision of effective diagnosis, testing, and treatment of malaria at the community level. As countries approach malaria elimination, delivery of interventions require greater precision in time and space to targeted and often difficult to reach populations that need specifically tailored malaria control strategies.

How can the delivery of malaria interventions be improved, particularly as countries approach national and subnational malaria elimination? A review in 2015 revealed that program management improvement methods used outside of the health sector could provide numerous gains to provision of health and particularly malaria.[4] In this paper we highlight the value of three approaches: first, the use of standard quality improvement (QI), second, quality management (QM); and third, the use of Participative Process Improvement (PPI). QI and QM comprise techniques where people within the health systems are asked to seek improvement of a pre-defined problem, whilst PPI is a bottom-up approach where the problems chosen for improvement are defined by the people delivering the interventions (Table 1).[5,6]

As they are synergistic, we suggest that the three approaches be combined to form one composite approach to malaria program management improvement. For convenience, we refer

92   to the integrated approach as Combined Quality and Process Improvement (CQPI). We propose

93   CQPI as a promising means of overcoming operational challenges to malaria control and

94   elimination, with recent evidence suggesting CQPI can make a significant impact when focused

95   at the district-level.[7,8] Building upon the authors growing experience in implementing CQPI for

96   malaria control and elimination, the team have developed the Leadership and Engagement for

97   improved Accountability and Delivery of Services Framework (LEAD Framework) that provides

98   detailed instructions to support program level implementation of CQPI[9].

99

100   **Main Text**

101

102   **Improving program management practices for malaria elimination**

103   CQPI offers a new area of focus for malaria control and elimination programming that can

104   substantially improve the quality and precision of intervention delivery. The approach

105   incorporates rigorous methods for monitoring and evaluating organizational performance

106   where challenges to implementation occur, and has been shown to improve user satisfaction

107   and staff motivation while reducing consequences associated with inappropriate clinical

108   decisions.[10-12] Most widely demonstrated to be useful for HIV, QI and QM are now being

109   recognized for their effectiveness and impact by Ministries of Health, and are also being applied

110   in maternal, newborn, and child health, and tuberculosis programs.[13] Within malaria programs,

111   QI and QM are currently limited to quality assurance schemes for diagnostics, medicines, and

112   occasionally for case management, typically in donor funded settings, but with tremendous

113   potential to grow.[7,13]

114

115   For malaria, the addition of PPI to QI and QM also offers specific added value in addressing

116   three major operational challenges to malaria elimination. First, in settings preparing for

117   malaria elimination, those increasingly more at risk of malaria often have the weakest access to

118   the health system, posing operational challenges to the effective and efficient delivery of

119   services.[14] Second, malaria epidemiology becomes increasingly site specific, requiring tailored

120   solutions that are best solved locally with input from frontline staff and communities. Third,

121   funding for malaria tends to drop as it becomes less of a national priority, with staff often being

122   required to deliver services to multiple health programs. Staff motivation can suffer as they

123   typically do not have access to training or mentorship in time, resource or quality management;

124   three challenges currently resulting from the top-down delivery of interventions with minimal

125   input from affected communities.[15] PPI, which is designed to harness insight from local

126   stakeholders, holds particular value for confronting these challenges.

127

128   CQPI therefore offers the potential to foster rigorous attention to vector data, urgent case

129   management and response, and inventory control necessary for preventing transmission while

130   cultivating qualities such as inventiveness, proactivity, accountability, mutual trust and

131   confidence, all of which enhance staff motivation.

132

133   While program management techniques are most often applied at the health facility level, we

134   recommend that CQPI for malaria control and elimination be applied through a subnational

135   approach involving the interaction of district and regional level teams with facility staff to

136   enable district-level malaria control and elimination management and programming. The

137   district is an appropriate conduit between the technical and strategic oversight of the national

138   level program and the communities at risk of malaria.[14] Placing the district at the center of CQPI

139   enables all levels of the system to tackle highly contextual challenges while improving staff

140   motivation.

141

142   **CQPI Pilot Studies**

143   Although evidence on program management improvement approaches for malaria control and

144   elimination is scarce, CQPI was piloted at the district-level in Eswatini (2016-17), Zimbabwe

145   (2016-18) and Namibia (2019-20). The intervention design and methodologies evolved and

146   were refined over the time period of three pilot studies. However, certain core elements were

147   common to all three pilots. The learnings from the pilot program form the backbone of the

148   LEAD Framework[9]. Table 2 provides an overview of the methodologies employed in the pilots,

149 limitations of these studies and the practical lessons learned with respect to the

150 implementation of CQPI.

151

152 Table 3 provides a summary of the results for all three pilot studies. Results for Zimbabwe have

153 been published elsewhere [8] and for Namibia will be forthcoming. Evidence of outcomes is

154 encouraging, demonstrating the feasibility of improving productivity of district-level teams

155 relatively easily and cheaply. The key driver of improvement is the increased ability of

156 healthcare professionals to identify task and role-specific challenges in local contexts and work

157 together to overcome them in collaboration with community stakeholders. By enabling in-

158 depth analysis, problem solving and ownership by district offices and health facilities, CQPI built

159 up an awareness of specific challenges and created an accountable process for action.

160

161 **Proposed changes in practice to improve malaria program management**

162 The successful pilot of CQPI affords an opportunity to build a scalable, sustainable and effective

163 health systems improvement model for the complex challenge of district-led malaria control

164 and elimination. This framework should incorporate prioritized process and outcome indicators

165 to guide the challenge areas, although the choice of activities and indicators for specific

166 improvement should be made at the operational unit of delivery, proposed as the district-level,

167 with inclusion of essential national program indicators if requested by the national level. The

168 LEAD framework based on the CQPI pilots in Eswatini and Zimbabwe, and then tested in

169 Namibia, is available as a tool for reference and for others to use[9].

170

171 When implementing CQPI, people from across the vertical and horizontal layers of the system,

172 including key community actors, were drawn together to focus attention on current challenges

173 for implementation in districts, facilities and communities. Techniques such as root cause

174 analysis, peer-led problem solving, and attentive listening were applied. Such methods enabled

175 responsibilities to be identified, priorities agreed, improvement metrics established and a cross-

176 functional taskforce – a smaller sub-grouping of the 'system in the room' (see Table 1 PPI

177 definition) - selected on the basis of a representative staff 'fit' with the process improvement

178   work that needed to be done. Regular structured reviews ensured that milestones were met,

179   and further techniques were introduced as needed. The process described above should be

180   repeated at least annually, to support continuous identification of new challenges and support

181   for relevant initiatives to tackle them. When building PPI into malaria program strategies, the

182   framework shown in Figure 1 can be applied.

183

184   Expert facilitation of this workshop process is necessary to ensure a continuous focus on

185   challenges and to prioritize and mitigate dynamics that could silence or marginalize

186   perspectives that may offer crucial insight. These dynamics include (but are not limited to)

187   effects of unequal status, gender, hierarchical position, resource-based power, and so forth.

188   This expert facilitation can be 'home grown', as was the case for the CQPI pilot studies in

189   Eswatini, Namibia and Zimbabwe, where malaria workers undertook an accredited 6-month

190   training, and thereafter gradually took on facilitation, first supporting and then replacing the

191   external facilitators. We recommend on-going peer-supervision for facilitators, under the

192   guidance of senior professionals, ideally located in the same country.

193

194   **Investment opportunity**

195   The CQPI approach offers an inexpensive path to significant improvements to the delivery and

196   effectiveness of malaria control tools. It also has the potential to strengthen the overall health

197   system. Efforts to improve operational performance of health systems must no longer be

198   neglected in place of "magic bullets" such as vaccines or gene drives. Technologies that improve

199   collation and presentation of information, such as spatial decision support systems suggesting

200   courses of action for workers are helpful,[16] but without the skills to make decisions, identify

201   organizational inefficiencies, and develop adaptive responses, "data for decision-making"

202   efforts will fail.[17] Technology and information alone will not solve the malaria challenges faced

203   by districts.

204

205   This gap between information and effective problem solving can only be bridged by engaged

206   staff who are motivated by being part of a committed and well-supported team with shared

207   objectives and clear lines of accountability. These are the necessary *organizational* conditions

208   for successful application of technical improvements. Reassuring financiers that new

209   technologies will actually be used and integrated into the health care process is critical. CQPI

210   has been effective in filling this gap between information and effective problem solving, but it

211   now needs further evidence to back it up before countries and financiers will invest at large

212   scale.

213

214   The CQPI approach addresses several issues currently faced in the malaria space, including the

215   need to create a platform for true community participation in the design and implementation

216   of malaria control and elimination strategies, as well as the need to transition from malaria-

217   centric to programmatic approaches targeting multiple disease areas. CQPI has the potential

218   to engage varied private sector and traditional practitioners in the design and implementation

219   of locally tailored strategies, addressing an unmet need.[2]

220

221   **A path forward for policy makers, financing institutions, implementers and researchers**

222   Malaria programs are in need of a paradigm shift; one that places effective management and

223   efficient organization at the centre of efforts to achieve high quality care.[2] As countries

224   progress towards malaria elimination, we anticipate the growing importance of insight from

225   districts and communities to improve the delivery of malaria services. Results from Eswatini,

226   Namibia and Zimbabwe suggest that improving program management will be scalable,

227   relatively inexpensive, and effective. Furthermore, CQPI supports the movement towards

228   Universal Health Coverage (UHC), enabling frontline workers to deliver high quality care in

229   central locations and at the fringes of the system. In short, it provides the means to harvest

230   some very ripe 'low hanging fruit'. What follows are suggested next steps that key stakeholders

231   should take.

232

233   Policy makers

234   QI and QM for health systems service delivery is already being supported by the WHO through

235   the Department of Service Delivery and Safety and the new National Quality Policy and Strategy

236   Handbook.[16] This unit at the WHO should consider the inclusion of CQPI alongside the other

237   quality improvement interventions. Were the WHO to endorse applications of CQPI it would

238   increase accountability and buy-in from the frontlines, building capacity and strengthening the

239   quality of delivery necessary for UHC. We also recommend that the WHO Global Malaria

240   Programme integrate the recommendations in the Department of Service Delivery and Safety

241   strategies. Delivery is a long recognized challenge by the WHO, and malaria CQPI modules

242   should be developed and implemented.

243

244   <u>Financing institutions</u>

245   Financing is required to implement CQPI strategies [2]. Sources of funding could include domestic

246   financing, donor assistance, or a combination thereof. We recommend commencing with donor

247   assistance to build an evidence base on the effectiveness of these combined strategies and

248   approaches, and ascertain their expected low cost of implementation at scale [8].

249

250   We recommend a two-stage approach to financing this shift. The first would entail support

251   from major international donors. This would be a novel area of investment for major donors,

252   such as the Global Fund to Fight AIDS, TB and Malaria, USAID, and DFID. These donors would

253   need to decide if such investments would be for health systems generally, or disease-specific

254   interventions. If they are not yet ready to invest in CQPI, what further evidence is required to

255   consider their implementation, and who is willing to fund learning-by-doing projects to provide

256   evidence to governments and donors?[2]

257

258   Presumably international donors will recognize these methods and give them an opportunity

259   for wider implementation, allowing for their value to be recognized. If this stage is reached, we

260   recommend that donor funding be carefully withdrawn in place of domestic funding, a

261   transition we anticipate to be challenging but could take place gradually.[2]

262

263   <u>Implementers and researchers</u>

264 We suggest three strands of information gathering for CQPI to improve district malaria program

265 management. First, what are the costs and benefits of a Malaria CQPI program when

266 implemented at scale? Clearly, evidence of cost-efficiency and impact of such a program would

267 be helpful for policy makers and financiers of health. Second, what are the comparative and

268 synergistic effects of CQPI and new technical solutions for targeting and tailoring interventions,

269 such as Spatial Decision Support Systems,[17] in settings where progress has plateaued? Third,

270 how does CQPI improve worker motivation and health service utilization? Undoubtedly,

271 evidence-based answers to this question would help financiers understand the additional

272 benefits of improving district-level health performance. We have tried to set out the

273 opportunity that CQPI affords, but the longer we wait, the longer we stall along the path to

274 malaria eradication.

275

276 **Conclusion**

277 Management challenges are widely cited as a barrier to malaria control and elimination and

278 eventual eradication, yet training and capacity building in this area is typically targeted at the

279 national level. CQPI offers a means of building management capacity at the district-level, where

280 it is most needed. Pilot studies have shown that CQPI is feasible and scalable at low cost, and

281 has resulted in important quantitative and qualitative improvements in malaria programs in

282 Eswatini, Namibia and Zimbabwe. CQPI solutions to improve the acquisition of timely and

283 detailed malaria surveillance data to enable swift and site-specific operational responses are

284 needed for all locations approaching malaria elimination. The malaria community must resolve

285 the paradox that results from simultaneously knowing that there is a problem in service

286 delivery yet not being willing to invest in solutions that target that problem.

Declarations

- Ethics approval and consent to participate

No ethics approval was sought for this research in practice paper.

- Consent for publication

Not Applicable

- Availability of data and materials

Data sharing is not applicable to this article as no datasets were generated or analysed for this article. The results shared in Table 2 are in the public domain for Zimbabwe[8]. Data for Namibia are submitted for publication and are available from the corresponding author. Data from Eswatini are not publicly available due to restrictions in permissions and may be available from the corresponding author on reasonable request.

- Competing interests

No authors report any competing or conflicts of interest

- Funding

- Authors' contributions

BA, PCase, DC, IC, PChitapi, AC, RG, JG, JM, CSG, JT, GV conceptualized developed the ideas into a practical program. PCase, RC, PChitapi, AC, RG, JG, MG, MM, PM, JM, GV implemented the organizational development work, BA, DI and JM implemented the quality improvement aspects of the work. BA, PCase, IC, DI, RG, JG wrote the first draft of the manuscript. All authors contributed the final manuscript and approve the submission.

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317 **Table 1: Definitions and Descriptions of Combined Quality and Process Improvement, Quality**

318 **Improvement, Quality Management, and Participative Process Improvement**

Term	Definition
Combined Quality and Process Improvement (CQPI)	An approach that involves simultaneous implementation of three synergistic approaches to process improvement: Quality Improvement, Quality Management, and Participative Process Improvement.
Quality Improvement (QI)	Quality Improvement in this article to refer to a generic set of principles: systems-thinking which includes formal root cause analysis (QI toolbox); understanding variation; continuous cycles of measurement and improvement; testing of changes (Plan-Do-Study-Act); peer learning, teamwork, and involving consumers. Of these, the first three are the most essential.[18]
Quality Management (QM)	QM relates to a HEALTHQUAL framework that has evolved and been trialed over time [11,19,200]. Elements include: 1) leadership and governance; 2) a formal QM plan; 3) organizational infrastructure, including a technical working group or committee; 4) a performance measurement system with specific indicators; 5) procedures for implementing and sustaining continuous QI activities; 6) workforce capacity building of QI capabilities; 7) patient/community involvement; 8) knowledge management; and 9) outcomes assessment.
Participative Process Improvement (PPI)	Participative Process Improvement, as referred to in this article, also known as participative action research [4,15] is informed by aspects of generic QI and the HEALTHQUAL framework, but comprises a specific set of interventions designed to enhance healthcare service delivery and

organizational effectiveness. Where organizing is seen as a process that requires continuous and numerous activities, PPI enhances capacity for crucial aspects of human relations and activities – typically the softer aspects that rely on such qualities as listening, respect, reflection, and adapting to 'political' realities [21,22,23]. PPI interventions often include structured techniques such as those included in QI and QM, along with others explicitly designed to evince insight from frontline and community-based stakeholders [233]; to engage line managers in responding to these insights; and to embed accountability for change at all levels of the system. Examples are a) peer-led problem solving, b) attentive listening, c) process mapping, and d) assessment of inter-group dynamics. PPI is most effective when a 'system in the room' approach is adopted. The term 'system in the room' is taken from the field of psychosocial studies and organizational dynamics.[24,25] This entails replicating the programme/service delivery system as fully as possible in a shared workshop setting (e.g., a conference room). Representation includes not only the healthcare professionals at district level who are responsible for service provision, but also more senior staff and resource holders from provincial and ministry levels as well as community decision-makers and intended beneficiaries. Full representation enables sharing of perspectives and challenges from across the system and helps inform collaborative generation of challenges, synchronized solutions and collective support for those whose role it is to implement frontline solutions

	that involve changes in processes and procedures. Ensuring that those with the seniority to authorize and resource changes is critically important to the process.
Leadership and Engagement for improved Accountability and Delivery of Services Framework (LEAD Framework)	A practical tool to support the implementation of CQPI for health program use. The framework and supporting documents can be found at http://www.shrinkingthemalariamap.org/tool/leadership-engagement-improved-accountability-delivery-services-framework-lead

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322   **Table 2: Pilot studies methodologies, activities, data collection methods and analysis,**
323   **limitations, implementation lessons**
324

Countries, Provinces and Districts	Methodologies (See Table 1 for definitions and methods)	Activities	Data Collection & Analysis
Eswatini (1 malaria season 2016-17) Country-wide project	PPI exclusively	Pre-malaria season 'system in the room' workshops (c.40 participants) – challenge identification and formation of Task Team implementation subgroup, external expert inputs on malaria elimination; Coaching and facilitation support to individuals and teams; 3 x in-season Task Team workshops (c.12 participants) to develop and implement work plans; Post-malaria season 'system in the room' workshop – review outcomes and planning for next season (c.40 participants).	Workshop and Task Team participation evaluation tools Metrics for monitoring and evaluation of specific challenges developed in liaison with NMCP and font line staff (closest to the issues). Data collected and analysed by Task Team – aided by project team experts. Monitored through implementation country work plan. Results reported to sponsor via project team.
Zimbabwe (3 malaria seasons 2016-19) <u>Matabeleland South</u> Beitbridge Gwanda Matapos <u>Matabeleland North</u> Binga Bubi Hwange Lupane Nkayi	PPI, QI, QM	**NB the following activities were repeated 3 x 2016-19)** Pre-malaria season 'system in the room' workshops (c.40-50 participants) – challenge identification and formation of Task Team implementation subgroups (12 in total), external expert inputs on malaria elimination; University certified training in CQPI (6 graduates);	Workshop and Task Team participation evaluation tools Metrics for monitoring and evaluation of specific challenges developed in liaison with NMCP and font line staff (closest to the issues). Data

Tsholotsho Umgaza Midlands Chirumhanzu Kwekwe		Coaching and facilitation support to individuals and teams; 3 x in-season Task Team (TT) workshops (c.12 participants) for each of the 12 districts (i.e., 12 TTs x 3) to develop and implement work plans; Post-malaria season 'system in the room' workshop – review outcomes and planning for next season (c.40-50 participants).	collected and analysed by Task Team – aided by project team experts. Monitored through the 12 district-level implementation work plans. Results reported to sponsor via project team.
Namibia (1 malaria season 2019-20) Kavango East Kavango West	PPI, QI, QM, in the form of the LEAD Framework	Pre-malaria season 'system in the room' workshop (c.50 participants) – challenge identification and formation of 2 x Task Team implementation subgroups (8 per district team – 16 total), external expert inputs on malaria elimination; University certified training in CQPI (12 graduates); Coaching and facilitation support to individuals and teams; 6 x in-season Task Team workshops for the 2 districts to develop and implement work plans; Post-malaria season 'system in the room' workshop – review outcomes and planning for next season (c.50 participants).	Workshop and Task Team participation evaluation tools Metrics for monitoring and evaluation of specific challenges developed in liaison with NMCP and font line staff (closest to the issues). Data collected and analysed by Task Team – aided by project team experts. Monitored through the 2 district-level implementation work plans. Results reported to sponsor via project team.

Limitations
- The impact of external influences on the program and outcomes was not assessed (e.g., co-investment by other agencies such as the United States Agency for International Development/President's Malaria Initiative and/or the Global Fund to Fight AIDS, TB, and Malaria may have indirectly impacted some pilot studies results).
- Neither experimental nor quasi-experimental design was employed. Control districts were not included as part of the pilots from which routine data could be collected as a comparison to intervention districts. Therefore we cannot say that the CQPI intervention

was causal with improvement, only that in the observational pilot programs that CQPI is likely to have been the driver of improvement.
- Project costs were relatively high in the design phase. With the training of local facilitators, costs decreased in later stages of implementation (e.g., graduates of a university certified training program in Zimbabwe were employed as consultants to assist with CQPI implementation in Namibia).
- Limited evidence gathered for sustainability post-project due to limited funding and sustainability planning.

Implementation: key lessons
- It is imperative to negotiate and secure authorization for CQPI intervention at ministry level (e.g., official endorsement by NMCP director). NMCP-level participation in key CQPI events, such as, inception workshops and provincial review workshops is highly desirable as this can facilitate top level buy-in and support. In one of the pilots, the NMCP director changed mid-stream and the new role holder withdrew support for CQPI. This severely compromised the process and prevented further outcomes being achieved.
- Active (authorized) participation of senior provincial staff in CQPI activities, e.g., Provincial Medical Directors (PMDs) attending and contributing to CQPI workshops and taking an active interest in the development and outcomes of district-level work plans. A supportive PMD often has the ability to mobilize the resources necessary to implement work plans.
- Similarly, enrolment of senior district-level staff is critically important to successful implementation of CQPI.
- The fuller the representation of the 'system in the room' (see Table 1 for definition) at key CQPI events, the better the chances of identifying and implementing 'joined-up' service delivery sollutions. Over the course of the three pilots, we learned that the involvement and buy-in of community leaders and influencers (e.g., faith leaders, traditional healers, etc.) impacted outcomes positively.
- Devolvement of budgets to subnational level serves to improve implementation of solutions (enhances responsiveness of local actors to malaria challenges). Devolved budgets are planned in many countries as part of Universal Health Coverage plans.

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326

327 **Table 3. Outcomes from CQPI pilots in malaria programs in Eswatini, Namibia and Zimbabwe** [8]

Country	Year of implementation	Notable outcomes
Eswatini, nationwide	2016-2017	Improvements in the reporting of malaria cases by health facilities and increased collaboration between the malaria program, schools, and community organisations. It also led to improved communication between leaders within the NMCP.
Zimbabwe, 2 Districts	2016-2018	Increase in the availability of malaria registers from 83% to 93% (25/30 health facilities to 28/30 health facilties) , a reduction in artemisinin combination therapy stockouts from 22% to 6%, and an increase in the timeliness of case investigation within three days from 55% to 65% (65 cases investigated out of 119 reported to 821 cases investigated out of 1,265 cases reported). A second year resulted in a further improvement in the timeliness of case investigation to 92%, together with better interprovincial collaboration, and the initiation of meetings to harmonize surveillance.
Zimbabwe, 11 Disticts	2017-2018	In Matabeleland North, one year of implementation resulted in an increase in the administration of primaquine from 63% (90 cases treated/142 RDT positive cases) to 75% (76/101), an increase in slide examination rates from 81% to 89% (115 slides examined/142 RDT positive 142 cases to 90/101), an increase in fully investigated cases from 88% (125 cases fully

		investigated out of 142 RDT positive cases) to 98% (99 cases fully investigated out of 101 RDT positive cases), the development of a system to reduce stockouts of drugs and diagnostics that resulted in an improvement from 50% to 70% stock, and the increased disbursement of LLINS from 37 to 98% (14,535 to 38,499 out of 39,285 LLINs) by moving distribution centers closer to villages. In Midlands, operational improvements included an increase in the correct treatment of confirmed malaria cases from 93% to 100% in one district and an increase from 89% to 100% in another district and an improvement in case investigation rates from 80% to 100%. Qualitative results for this season in Matabeleland North, included: increased collaboration with partners involved in malaria activities and improvements in staff motivation and accountability. In Midlands province, outcomes included: improvements to data quality, completeness, and timeliness; increased community engagement activities; and improved communication, ownership, and teamwork. More importantly, participants across all provinces reported an increased ability to analyze problems, act on solutions, and measure performance.
Namibia, 2 Districts	2019-2020	40% increase in reporting (60% complete, timely reports to 100% (4131/4131) in both districts), a 32% average increase in cross-border reporting and tracing of malaria cases (41% to 79% (55/70)

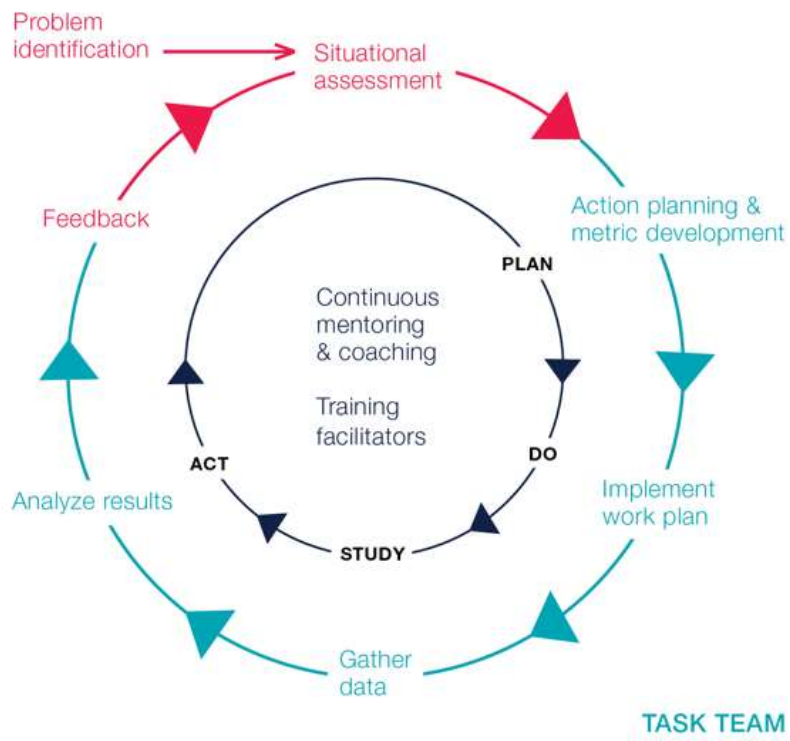|		in Nankudu and 20% to 45% (41/91) in Rundu), and a 10% average increase in improved management of malaria cases (89% to 100% (2778/2778) in Nankudu and 89% to 98% (1326/1353) in Rundu), integration of malaria activities into the operational plans of local platforms, an elevated profile for malaria among other infectious diseases, and increased access to subnational resources, including vehicles, fuel, and radio spots. The programme was institutionalised into existing structures within the health system, and participants have integrated the relevant skills and approaches in their respective roles, providing evidence of sustainability beyond the programme period.

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331

332   **Figure 1**. **Participative Process Improvement Model for District and Provincial Teams** [8]

333   This figure depicts the annual PPI cycle, starting with an initial workshop consisting of the

334   'system in the room' at the top, where problems are identified and a situational assessment is

335   conducted. Participants include representatives from national and provincial malaria and health

336   leadership, district workers from cadres involved in delivering malaria activities and community

337   representatives including local politicians, traditional healers etc. that should receive them. A

338   prioritized list of problems are then transformed into a work plan with associated metrics by a

339   self-selected multidisciplinary Task Team of 8-10 people. The Task Team implements the work

340   plan, devising solutions to each challenge, gathers data, and analyzes results in a Plan-Do-

341   Study-Act cycle, while also receiving continuous mentoring and coaching. At the same time,

342   local facilitators are trained in how to lead the workshops and Task Team meetings. A follow-up

343   workshop closes the loop, during which progress on problem-solving is fed back to the group,

344   and the cycle begins again with the resolution of some problems and the addition of new

345   problems.

346

WORKSHOP

Problem identification → Situational assessment

Feedback

Action planning & metric development

Continuous mentoring & coaching

Training facilitators

PLAN

DO

ACT

STUDY

Analyze results

Implement work plan

Gather data

TASK TEAM

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348   **<u>References</u>**

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