


BMJ Open Quality Influence of context on quality improvement priorities: a qualitative study of three facility types in Lagos State, Nigeria

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ABSTRACT

Background Quality improvement (QI) collaboratives are increasingly popular. However, there is a need for an in-depth understanding of the influence of context on its implementation. We explored the influence of context on the change concepts considered by public primary (primary health centres), public secondary (public hospitals) and private (private facilities) collaboratives established to improve maternal and newborn health outcomes in Lagos State, Nigeria.

Methods Between February 2019 and January 2020, we conducted a qualitative study using meeting reports, key informant interviews and participant observation. Data were analysed using the high-quality health system framework for assessing health system and user experience that distinguished three quality domains: quality impacts, processes of care and health system foundations.

Results Nineteen change concepts and 158 change ideas were observed across 28 facility QI teams. Change concepts and ideas prioritised were influenced by government and non-governmental leaders but ultimately shaped by facility QI capacity, time allocated for QI activities and availability of local data. Of the three quality domains, process of care, including patient satisfaction, received the most attention across facility types. There was considerable variation in the change concepts considered across domains. For example, more public hospitals focused on complication management because of a relatively high prevalence of and capacity to manage maternal complications; primary health centres focused more on complication referrals, while private facilities prioritised revenue generation. Problems with availability of resources were particularly highlighted in primary health centres which had relatively less financial commitment from stakeholders.

Conclusion Our findings provide insights into QI collaboratives' mechanism of change in which external stakeholders, including government, drove QI priorities for action but the ultimate decisions depended on local realities of facilities. Our findings underscore the need for strong QI leadership and sufficient resources to enable facility QI teams to prioritise change concepts for greater health impact.

Key messages

What is known about the subject?

► Contextual factors are known to affect the implementation of facility-level quality improvement (QI) but there is a lack of evidence about how context influences the prioritisation of change concepts when QI is implemented in low-resource settings.

What this study adds?

► Working in primary healthcare facilities, hospitals and private hospitals engaged in QI in Lagos State, Nigeria, this study describes an inductive approach to mapping change ideas using a quality framework.

How this study might affect research, practice or policy?

► Understanding the internal and external contextual factors that influence priorities in different facility levels could be leveraged to support implementation of QI initiatives in low-resource settings.

The study provides new insight into the mechanism of change of quality improvement (QI) at facility level, observing that QI priorities are shaped by both internal and external contextual factors, with the ultimate decision for QI action in facilities depending on internal factors.

BACKGROUND

Improving the quality of care provided in health facilities is essential to achieve Sustainable Development Goal 3 on health.^{1,2} One of the key strategies is QI collaboratives using the breakthrough collaborative approach^{3,4} which seeks to achieve large-scale improvements by bringing QI teams from different health facilities from similar settings together to improve processes in their respective facilities with the support of QI subject experts. These teams are expected to apply QI learning to their facility contexts by developing, testing and

implementing change ideas that could address a change concept.

Change concepts encompass problems that teams want to address, grouping actionable ideas for changing a process.^{5,6} Given the emphasis on local problem solving, it is important to acknowledge the influence of context on the change concepts prioritised by QI teams.

For this study, we defined contextual factors as a set of characteristics and circumstances internal to the organisation (eg, local priorities of a facility type) and those external to the organisation including (eg, leadership and governance of the state health system) that interacts, influences, modifies, facilitates or constrains an intervention and its implementation.⁷⁻⁹

Understanding how context influences QI priorities could provide insight into the mechanism of change, and this could be leveraged to shape implementation for maximum benefit.^{8,10,11} This is important in Lagos State, Nigeria, where the maternal mortality rate (MMR) was estimated at 450 deaths per 100 000 live births in 2008 and neonatal mortality rate (NMR) of 29 deaths per 1000 live births in 2016^{12,13}; both estimates being far higher than the Sustainable Development Goal country targets of MMR less than 140/100 000 and NMR less than 12/1000 by 2030.¹⁴ Seeking to improve maternal and newborn outcomes and patient satisfaction, the Lagos State Ministry of Health, the Primary Health Care Board and managers of private facilities implemented the Nigeria Healthcare Quality Initiative (NHQI), a QI intervention using a modified collaborative learning approach.¹⁵ An initial pilot phase ran from November 2014 to September 2017, followed by a scale-up phase between November 2017 and October 2020. Three facility types were enrolled: public primary healthcare centres (PHCs), public secondary hospitals and private facilities. The modified collaborative learning approach entailed capacity building through three collaborative learning sessions (one for each facility type) and more local cluster meetings to bring QI teams together for peer-to-peer learning. The three collaboratives had a shared goal to reduce facility-based maternal and neonatal mortality and improve patient experience through broad change concepts, but it was anticipated that their complex and diverse needs, priorities and interests would result in numerous local adaptations to those change concepts.¹⁶

This study sought to understand whether and how the change concepts differed across facilities in Lagos State and examined how differences were influenced by contextual factors relating to facility type, health system and the stakeholders.

METHODS

Study design

We conducted a qualitative multiple-case study in which we defined a case as a collaborative of each facility type.

Study setting

The study took place in Lagos State, Nigeria with a population of about 24 million people and over 10 000 skilled

health workers providing services across 3 tertiary hospitals, 26 public secondary hospitals, 333 PHCs and 2886 private facilities.¹⁷ About 27% of deliveries occur in public facilities, 48% in private facilities and 25% at home or other locations.¹⁸

Lagos State Government works with organisations to implement quality initiatives in facilities (table 1), ensures patient rights are protected through its service charter initiative^{19,20} and leverages the State Health Insurance Scheme to achieve universal health coverage.

Study population

The eligible study population included all 50 facilities (6 PHCs, 19 public hospitals and 25 private facilities) enrolled in the NHQI scale-up phase. These were facilities with: (i) perceived will and commitment of leadership to engage in QI activities; (ii) high volume of maternal and neonatal cases; (iii) sufficient staff numbers to enable the formation of a QI team within the facility and (iv) availability of a data manager to organise and make facility health data accessible to the QI team.

Data collection

Between February 2019 and January 2020 we reviewed QI team meeting reports, conducted key informant interviews with state and facility stakeholders and observed collaborative learning sessions and cluster meetings (table 2).

1. Meeting reports: we approached all 50 facilities to access reports of the QI team meetings between February 2019 and January 2020. The report template comprised sections on the problem description, method of problem identification, aim statement, change ideas and measures used to track performance.
2. Key informant interviews were conducted in English, with participants purposively drawn from state-level government agencies, non-governmental organisations (NGOs) involved in QI, and from enrolled facilities.

An initial list of government agencies and NGOs for interview was identified from discussions with the NHQI implementer and the list grew to include other organisations based on emerging findings.

State-level participants (state government and NGO-level stakeholders) were eligible if they played an active role in NHQI design or implementation or were involved in other projects with possible facility-level interactions with NHQI. Facility-level participants were selected from the facilities that regularly submitted QI team meeting reports. QI team members who regularly attended facility QI team meetings, were knowledgeable about the QI activities in the facility, and who consented to a recorded interview were selected.

Potential participants were initially contacted over the phone or by email, an information sheet provided, and the content discussed before asking for written consent for a face-to-face interview. We used a topic guide to ask state and facility level participants about the operationalisation of QI at the state and facility levels, including what

Table 1 Organisations implementing quality initiatives in Lagos State

Organisation	Role description
Government	<p>Health Service Commission</p> <ul style="list-style-type: none"> ▶ Governs and supports state-owned secondary health facilities.²⁶ ▶ Staffs the public secondary hospitals and by extension, regulates their practices. ▶ Joint facilitation of collaborative learning sessions and cluster meetings.¹⁵ <p>Hospital Management Board</p> <p>Facility-level committee comprises the hospital's medical director and heads of departments/units of state-owned secondary health facilities responsible for the day-to-day running of each hospital.²⁶</p> <p>State Primary Healthcare Board</p> <ul style="list-style-type: none"> ▶ Oversees activities of all the PHCs.^{15 26} ▶ Joint facilitation of collaborative learning sessions and cluster meetings.¹⁵ <p>Local Government Area Council</p> <p>Finances the day-to-day running of the PHCs located within its area council, including funding implementation of change ideas.^{15 26}</p>
Non-governmental	<p>Health Strategy and Delivery Foundation</p> <ul style="list-style-type: none"> ▶ Coimplemented NHQI with the state government. The NHQI focused on building the technical capacity of health workers on the use of QI methodologies to improve health processes and outcomes. The initiative entailed establishing collaborative learning sessions, coaching and mentoring, and supporting the facilities to conduct QI team meetings to develop change ideas that are expected to lead to an improvement.^{15 26} ▶ Joint facilitation of collaborative learning sessions and cluster meetings.^{15 26} <p>PharmAccess foundation</p> <p>Implements the SafeCare initiative that ranks the various facility types based on international standards and processes, thereby serving as a stimulus for providers to improve the quality of healthcare delivery.²⁷</p> <p>Evidence-4-Action-MamaYe</p> <p>Supports the state ministry of health and public hospitals in implementing Maternal and Perinatal Death Surveillance and Response (MPDSR) by measuring the prevalence of maternal and perinatal deaths, identifying the root causes of these deaths and proffering solutions.²⁸</p> <p>Saving One Million Lives</p> <p>Seeks to improve access to essential primary healthcare services for women and children by driving institutional processes to improve health outcomes.²⁹</p>

NHQI, Nigeria Healthcare Quality Initiative; PHC, primary healthcare centre; QI, quality improvement.

and how change concepts were considered. Data were collected until saturation was reached when additional data did not provide new information.²¹

3. Non-participatory observations were conducted at collaborative learning sessions and cluster meetings for each facility type, identified through opportunistic sampling; the researcher (AO) attended all the meetings he was aware of.²² For each meeting, the partici-

pants were notified that the session was being observed while the researcher made notes.

Data analysis

Data analysis was guided by the high-quality health system framework for assessing health system and user experience.² The framework describes three domains (quality impacts, processes of care and health system foundations) and 10 subdomains (table 3 in the Results section). QI meeting reports (labelled according to facility type) were reviewed for information on change ideas. Using an Excel template, these change ideas were inductively organised into broader change concepts before mapping against the 10 subdomains of the quality framework.

A coding template was subsequently developed in the NVivo V.11 software,²³ which was used to sort interview data. Transcripts were labelled and read several times to familiarise and understand the various components of contexts that informed the considerations given to certain change concepts.

Constructs relating to context such as leadership and prior QI team experience were identified from QI literature.^{7 8} These constructs provided a lens for reviewing the transcripts for characteristics that may influence priorities, such as facility's level of care, QI team competence, needs and priority; and availability of leadership, political

Table 2 Data collection

Study objective	Data collection method	Data source
To document change concepts considered by each of the three facility types	Meeting reports	QI team meeting reports
To understand how change concepts considered were influenced by the context of the three facility types, the Lagos health system and the stakeholders	Key informant interviews Participant observation	State and facility-level actors Collaborative learning sessions, cluster meetings

**Table 3** Summary of change concepts, problems, and change ideas developed by facility type

Domain	Quality subdomain	Change concept	No of distinct problems described	No of change ideas tested	No of facilities that tested the change ideas for this concept		
					PHC (N=6)	Public hospital (N=14)	Private facilities (N=8)
Quality impact	Better health	a. Strengthen complication management	7	31	4	12	4
		b. Strengthen complication identification					
	Confidence in system	–	0	0	0	0	0
	Economic benefits	a. Increase revenue generation	6	12	0	0	2
		b. Ensure patient financial protection					
Process of care	Competent care and system	a. Ensure disease prevention & health promotion	21	40	3	7	6
		b. Improve documentation					
c. Improve service uptake and continuity							
	Positive user experience	a. Reduce waiting time	17	44	5	10	4
		b. Improve ease of accessing care					
		c. Protect patients' dignity					
		d. Strengthen staff–patient relationship					
		e. Ensure clean and conducive environment					
		f. Provide quality meals					
Foundations	Population	–	0	0	0	0	0
	Governance	a. Ensure political buy-in of the management	1	1	0	1	0
	Platform	–	0	0	0	0	0
	Workforce	a. Improve staff welfare	8	11	1	2	3
		b. Ensure staff discipline					
Tools	a. Improve availability of commodities	10	19	4	6	2	
	b. Improve availability of equipment						
	c. Ensure supply of utilities, for example, water						
Total		19	70	158			

PHC, primary healthcare centre.

and financial support at state and facility levels. Subsequently, the influence of these characteristics on decision making around change concepts was explored.

The observations from collaborative sessions were used to (in) validate findings from facility QI team meeting reports and transcripts which largely reflect findings from facilities with active QI teams. Where necessary, findings from observations also informed iterative revision of the topic guide to facilitate exploration of new emergent sub-themes.

Two researchers (AO, TM) reviewed the codes for validity to ensure that they accurately reflected the subdomains and represented the data. These researchers regularly discussed to aid conceptual thinking and to increase analytic rigour. Additionally, analysis workshops were held with a larger team of implementers and researchers during and after the period of data collection. Data validity was ensured by triangulating findings from the QI team meeting reports and interview transcripts with

notes written during observation of learning sessions and cluster meetings for each facility type. Reflective notes were also kept throughout data collection and analysis.

Patient and public involvement

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

RESULTS

Data summary

From February 2019 to January 2020, a total of 140 QI team meeting reports were submitted by 28 of the 50 NHQI facilities (6 PHCs, 14 public hospitals and 8 private facilities). Forty-five key informant interviews were conducted, and 17 learning sessions and cluster meetings observed (table 4). Except for one public hospital, all facilities that participated in interviews submitted QI

Table 4 Overview of data collection*

Data collection method	State (government and non-governmental)	PHC	Public hospital	Private facility	Total
Meeting reports		15 QI meeting reports (from 6 PHCs)	87 QI meeting reports (from 14 hospitals)	38 QI meeting reports (from 8 private facilities)	140 reports from 28 facilities
Key informant interview	12 (in 4 organisations)	9 (in 3 PHCs)	11 (in 4 hospitals)	13 (in 7 private facilities)	45 interviews from employees of 14 facilities
Observation of meetings		5 cluster meetings	<ul style="list-style-type: none"> ▶ 2 learning sessions ▶ 6 cluster meetings 	<ul style="list-style-type: none"> ▶ 2 learning sessions ▶ 2 QI leadership training 	17 observations

*To protect anonymity, a detailed breakdown of interviewees is not provided.

PHC, primary healthcare centre; QI, quality improvement.

team meeting reports. Three of the seven governmental and NGOs invited for key informant interviews declined participation.

Domains of QI

Table 3 draws on the QI team meeting reports to map change concepts, problems and change ideas across the three domains of the framework. A total of 158 change ideas were developed to address 70 identified problems that are grouped under 19 different change concepts, all of which were defined locally to contribute to the shared goal of improving health outcomes and patient experience. Compared with other domains, processes of care had more change concepts considered and problems addressed through change ideas. A complete list of problem descriptions and change ideas developed is included in the online supplemental annex 1.

Quality impact

Quality impact includes three subdomains. While all facility types worked on better health outcomes, only private facilities had a change concept for economic benefits. No facility worked towards increasing confidence in the system.

Better health outcomes

All three facility types prioritised better health outcomes (4/6 PHCs, 12/14 public hospitals and 4/8 private facilities) although their change concepts varied. For example, management of complications was most popular in public hospitals which had a relatively high case prevalence of maternal complications that might lead to deaths, such as eclampsia. Explaining why this was less popular in private facilities, a state-level participant mentioned:

So, some private facilities did it [used checklist on adherence to eclampsia protocol] but we [QI leadership from government and non-governmental organizations] didn't roll it out collaboratively because private facility mothers were not dying ... So, we can't roll out eclampsia checklist across the whole,

but because it wasn't a problem for them, data didn't show that it was a problem for them.

With state-level support, public hospitals were also more likely to have a Maternal and Perinatal Death Surveillance and Response committee that examined the causes of mortality. A state-level participant explained that

There is a committee for MPDSR [Maternal and Perinatal Death Surveillance and Response] in every [public] hospital ... facility uses data from MPDSR file to form quality improvement project [develop change ideas]. For instance, if they had a death and the data showed there was a quality gap, the quality improvement team can work on it.

Another state-level participant highlighted the external influence in the form of supervisory support by one of the NGOs,

We [QI leadership from government and non-governmental organizations] also support the facility MPDSR committees with supportive supervisory visits, ... visit these facilities when they are holding their committee meetings to actually monitor the process and see how we can provide one support or the other ... We also hold a stakeholder meeting where we bring all the medical directors of these facilities and the officers both perinatal and maternal with the stakeholders, policy stakeholders to look at what the issues are ... action plan is also developed

No PHC considered management of complications, consistent with the protocol to refer women with complications. Instead they focused on identifying and referring complications, as explained by a state-level participant,

'Things like if they see a woman with high blood pressure they will refer, so you can't be checking complication management, do you get?'

Another limiting factor was thought to be that PHCs tended to employ non-specialist doctors who were less

able to make root cause analysis of obstetric or paediatric complications. As explained by a state-level participant,

‘... also because of manpower. So we were able to form more robust teams in the GHs [public hospitals], but what you have in the primary healthcare centres you just have one, you have doctors but the doctors are not that involved in MNCH [Maternal, Neonatal and Child Health], they were involved in GOPD [General Outpatient Department].’

Economic benefits

During this study period, only private facilities (2/8) prioritised the economic impact of healthcare provision to the facility and patients; Inefficient patient billing systems, inadequate stock-taking and cost-cutting through employment of individuals on national assignments with requisite skills but lower salary requirement were listed. This focus reflected the priority of private facilities to ensure financial security before investing in QI infrastructures. In the words of a state-level participant,

‘... financial bits affect QI because some MDs [private facility medical directors] will tell you, QI is taking away money from my hospital because you need to do somethings right. ... So, what we are looking at is: can you get your financial structure right?’.

One private facility considered a change concept on patient financial protection, seeking to manage patient costs by ensuring that only essential investigations were requested.

Processes of care

All facility types prioritised the two subdomains of the processes of care: competent care and systems and build positive user experience.

Competent care and systems

PHCs (3/6), public hospitals (7/14) and private facilities (6/8) prioritised competent care and systems, grouped into three change concepts: disease prevention and health promotion; documentation to aid diagnosis, treatment and decision-making; and improving service uptake through awareness creation and tracking continuity of care.

These concepts were largely externally motivated by the targets set by Lagos State Ministry of Health targets and partner NGOs. Explaining this, a state-level participant mentioned how satisfactory performance was important for accreditation and enrolment of facilities into the Lagos State Health Insurance Scheme,

‘... in preparation for the Lagos State Health Insurance Scheme, ... the [non-NHQI partner’s] assessment is quite important to the state, every facility wanted to do well’.

Furthermore, the participant added that sometimes facility QI teams had to balance the demands of several QI partners to manage their workloads,

... they [a non-NHQI initiative] used the same quality improvement team that was set up for NHQI activities. So I think the burden of the work was a lot on the quality improvement team so at some point they [QI team] had to decide, do we come up with change ideas, or do we just work with the quality improvement plan of [the non-NHQI initiative].

Corroborating the importance of the NGO’s assessment of facilities, a public hospital QI team member said,

‘... we were doing Lagos State mandate and Lagos State was backing us, they came with the NGO assessment of facilities. Part of the motivation was seeing that you were having results ... and the fact that Lagos State was scoring [assessing facility performance].’

Creating positive user experience

This subdomain was consistent with the state’s service delivery priority to improve patient experience and satisfaction and was addressed by PHCs (5/6), public hospitals (10/14) and private facilities (4/8). A state-level participant explained,

Last year, we [QI leadership from the government] were able to come together as the PHC board and as the State Ministry of Health to come up with a quality policy ... the State is moving towards improvement of patient’s experience, patient satisfaction, ... improvement of service delivery as a whole. The other policy ... is the service charter and the concept of the service charter is very similar to what they have in QI. ... It’s a cross-cutting state implementation for improving client satisfaction.

Nonetheless, each facility considered local realities and problems based on data when considering change concepts. For example, to reduce waiting times, facilities considered punctuality of health providers, staggering patient appointments, having additional service units and making patient navigation easier ... A PHC QI team member explained,

we have space constraints, ... we have challenges with the flow, there is a way the structure is, we just have to look for a way that will work for us, if you go to the consulting room, you just have to walk back to the lab and back to the consulting room, it is not really a smooth flow, it is not purpose-built.

Six public hospitals and four private facilities prioritised ease of accessing services, patient dignity and strengthening staff–patient relationships. The importance of respectful communication was being reinforced through multiple channels in the state, including from state government health teams. A public hospital QI team member explained,

‘... we have representatives from HSC [Health Service Commission of the Lagos State Ministry of Health] coming to discuss with us and telling us how our attitude affects our treatment outcomes, how it can lead to limitations if care is not taken ...’.

Patient feedback motivated two public hospitals to consider change concepts on providing quality meals. A state-level participant, however, said that prioritising ‘easier tasks’ could reflect the limited QI capacity of new QI teams,

it’s easier to work on kitchen than to work on mortality ... the first time the facilities were presenting change ideas ... they will work on the easiest things to tackle. I think mid-way into cluster meeting [mid-way into NHQI project], we started demanding that they come with their data. We were able to tell them that how come you are working on kitchen when people are dying ...

Second, with limited time allocated to undertake QI activities it was difficult to engage with more complex problems. The state-level participant added

‘we noticed that if you leave the facility, they will work on easier things ... they have their primary responsibility, and they do that full time. So, QI is an ad-hoc for them’.

Foundations

Governance, workforce and tools were prioritised by all facility types, although with varied frequency.

Governance

A public hospital QI team emphasised the role of facility management in change uptake,

... there can never be QI team without the management. If you come with an idea and the management is not in support, there is no way it can be implemented. ... because without the support, we can’t penetrate those departments. Once they know that the MD knows of what is happening, they [facility staff] won’t have a choice than to key in, ...

Workforce

Improving staff welfare and ensuring staff discipline were considered by PHC (1/6), public hospitals (2/14) and private facilities (3/8). Public hospitals and private facilities addressed staff welfare by incentivising staff and promoting staff rights. A private facility QI team member explained,

Hmm when I mean staff welfare ... I’m talking about the structure, the structure is not the building, we are talking about the people ... the things that make people want to do more, they are being appreciated, they are being motivated, they are being encouraged to put in their best.

A PHC and the three private facilities considered the importance of ensuring staff discipline through processes and structures that encourage punctuality and formal dressing.

Tools

Irrespective of type, facilities prioritised availability of tools (PHC (4/6), public hospitals (6/14) and private facilities (2/8)) but the change concepts differed, reflecting the varied access to tools, utilities and commodities. Availability of commodities was considered by five public hospitals (eg, blood to manage postpartum haemorrhage) and one private facility. A recent health system policy banning mandatory blood donation by husbands of pregnant women seeking to register pregnancy resulted in limited availability of blood, leading public hospitals to promote and incentivise voluntary blood donation within the hospital and host community.

Change concepts on ensuring adequate supply of utilities such as power and water were limited to three PHCs, reflecting their reliance on the local government council’s political and financial commitment, but this was often lacking.

Explaining this challenge, a PHC QI team member stated,

‘Again in the family planning, the water is not running, the toilets are not functioning, the sink is not working ... I can bet it when we tell the chairman [local government chairperson], we can be on it for a year. He will say write book [a lot of documentation]’.

Consequently, the PHCs resort to advocating organisations outside the local government council for support including provision of tools and basic amenities. Another PHC QI team member explained,

‘if you talk about challenges, what could it be? it has to be financial, ... maybe some organizations can assist as part of their CSR [corporate social responsibility]’.

DISCUSSION

During a 12-month period, 28 of the 50 NHQI facilities submitted documentation showcasing the change concepts and change ideas they worked on to reduce facility-based maternal and neonatal mortality and improve patient experience. A total of 19 change concepts and 158 change ideas relevant to 70 distinct problems were extracted from these reports. Our findings reveal that some QI priorities were common across facility types, often driven by the health system leadership and external stakeholders, including government or NGOs. But many priorities were shaped by facility-level context such as availability of clinical subject experts, available time and capacity of the facility QI teams, facility culture, magnitude of a problem according to data, the level of care expected of a given facility type and available finances.

The public hospitals and, to some extent, private facilities, but not PHCs, focused on complication management to enhance better health outcomes. This focus was explained by the level of care expected of public hospitals, a relatively high prevalence of maternal complications, availability of external support to conduct maternal death reviews, and availability of specialist doctors. Conversely, change concepts relating to tools, including utilities such as water and power supply, were mainly present in PHCs. Evidence on effective **QI** implementation across income settings suggests that availability of tools are essentials for an enabling environment for the workforce.^{3 7} Accordingly, an inadequate implementing environment may have limited the **QI** activities of PHCs, obliging them to prioritise utilities before considering change ideas that directly addressed patient care.

Individual leaders from government and NGOs play critical roles in influencing **QI** priorities at the facility level^{2 3 7 24} through coordination, support, mentorship and coaching to strengthen capacity of facility **QI** team and staff.^{3 24 25} These leaders, or sometimes the lack of them, were found to be important in Lagos State where facility teams with least **QI** capacity prioritised many easy tasks, such as quality of meals, while failing to address problems that could have greater impact on health outcomes.¹⁵ Overall, we observed that the modified collaborative approach of **NHQI**¹⁵ resulted in considerable differences in the actions taken by facility **QI** teams, driven to a large extent by diversity of facility problems, priorities and exacerbated where leadership was lacking.

Study strengths and limitations

This study makes key contributions to the body of knowledge on context and its role in influencing **QI** priorities across facility types within the same setting. Nonetheless, there are study limitations that need to be considered. The data reflects a snapshot of **QI** activities in only 28 of the 50 facilities enrolled in Lagos over 1 year: it was not possible to map information from facilities that did not submit reports. The mapping of change concepts, problems and change ideas was done together with key stakeholders in Lagos but was subjective and we did not study the extent to which change ideas were implemented. Finally, as in other qualitative studies, findings may not be generalisable beyond the study area, although many of the key findings appear to be consistent with literature from other settings.

CONCLUSION

This study provides insight into the mechanism of change of flexible (modified) **QI** collaboratives in which external stakeholders including the government drove **QI** priorities while the ultimate decisions for **QI** action depended on the local realities of facilities. The importance of ensuring adequate facility capacity and **QI** leadership emerged as crucial implementation inputs in this real-world example of **QI** in Lagos State.

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Contributors AO, TM conceptualised and designed the study; MO, JS, ZH reviewed the study protocol and provided critically important inputs; AO, TM coanalysed the data while AO drafted the manuscript; all authors contributed to the revision of the manuscript, read and approved the final manuscript. AO was responsible for the overall content as guarantor.

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REFERENCES

- World Health Organisation. SDG 3: ensure healthy lives and promote wellbeing for all at all ages 2020. Available: <https://www.who.int/sdg/targets/en/>
- Kruk ME, Gage AD, Arsenault C, *et al*. High-quality health systems in the sustainable development goals era: time for a revolution. *Lancet Glob Health* 2018;6:e1196–252.
- Zamboni K, Baker U, Tyagi M, *et al*. How and under what circumstances do quality improvement Collaboratives lead to better outcomes? A systematic review. *Implement Sci* 2020;15:27.
- Institute for Healthcare Improvement [IHI]. The Breakthrough Series: IHI's Collaborative Model for Achieving Breakthrough Improvement. Available: <http://www.ihl.org/resources/Pages/IHIWhitePapers/TheBreakthroughSeriesIHICollaborativeModelforAchievingBreakthroughImprovement.aspx>
- IHI. 5 whys: finding the root cause. Boston, Massachusetts, USA: Institute for Healthcare Improvement, 2021. <http://www.ihl.org/resources/Pages/Tools/5-Whys-Finding-the-Root-Cause.aspx>
- Institute for Healthcare Improvement [IHI]. Using change concepts for improvement. Available: <http://www.ihl.org/resources/Pages/Changes/UsingChangeConceptsforImprovement.aspx>

- 7 Kaplan HC, Provost LP, Froehle CM, *et al.* The model for understanding success in quality (MUSIQ): building a theory of context in healthcare quality improvement. *BMJ Qual Saf* 2012;21:13–20.
- 8 Coles E, Anderson J, Maxwell M, *et al.* The influence of contextual factors on healthcare quality improvement initiatives: a realist review. *Syst Rev* 2020;9:94.
- 9 May CR, Johnson M, Finch T. Implementation, context and complexity. *Implement Sci* 2016;11:141.
- 10 McDonald KM, Graham ID, Grimshaw J. Toward a theoretic basis for quality improvement interventions. *Center SUE-bP* 2004.
- 11 McDonald KM. Considering context in quality improvement interventions and implementation: concepts, frameworks, and application. *Acad Pediatr* 2013;13:S45–53.
- 12 Oye-Adeniran BA, Odeyemi KA, Gbadegesin A, *et al.* The use of the sisterhood method for estimating maternal mortality ratio in Lagos state, Nigeria. *J Obstet Gynaecol* 2011;31:315–9.
- 13 National Bureau of Statistics [NBS], United Nations Children's Fund [UNICEF]. *Multiple indicator cluster survey 2016-17, survey findings report*. National Bureau of Statistics United Nations Children's Fund, 2017.
- 14 World Health Organisation. Targets and strategies for ending preventable maternal mortality, 2014. Available: <https://www.healthynetwork.org/hnn-content/uploads/EPMM-Consensus-Statement.pdf>
- 15 Olaniran AA, Oludipe M, Hill Z, *et al.* From theory to implementation: adaptations to a quality improvement initiative according to implementation context. *Qual Health Res* 2022;32:646–55.
- 16 Bell SG, Newcomer SF, Bachrach C, *et al.* Challenges in replicating interventions. *J Adolesc Health* 2007;40:514–20.
- 17 HEFAMAA. Health standards in Lagos: health facility monitoring and accreditation agency, 2020. Available: <https://hefamaa.lagosstate.gov.ng/>
- 18 National Population Commission [NPC], ICF. *Nigeria demographic and health survey 2018*. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF, 2019.
- 19 LSMoH. Lagos State Ministry of Health Service Charter. In: *Unit SD, editor*. Lagos, 2012.
- 20 LSMoH. Lagos state health insurance scheme 2017.
- 21 Fusch P, Ness L. Are we there yet? Data saturation in qualitative research. *The Qualitative Report* 2015;20.
- 22 Suri H. Purposeful sampling in qualitative research synthesis. *Qual Res J* 2011;11:63–75.
- 23 QSR International, inventor NVivo Qualitative Data Analysis Software [Software]. U.S.A 2019.
- 24 Grol R, Grimshaw J. From best evidence to best practice: effective implementation of change in patients' care. *The Lancet* 2003;362:1225–30.
- 25 ØVretveit J, Bate P, Cleary P, *et al.* Quality collaboratives: lessons from research. *Qual Saf Health Care* 2002;11:345–51.
- 26 Lagos State. A law to provide the reform of the Lagos state health sector, Lagos state hospital management board, primary health care board, traditional medicine board and for connected purposes 2006.
- 27 PharmAccess. Launch of the SafeCare initiative: introducing standards to improve healthcare delivery, 2011. Available: <https://www.pharmaccess.org/update/launch-of-the-safecare-initiative-introducing-standards-to-improve-healthcare-delivery/>
- 28 Evidence-for-Action. Lagos State MPDSR report 2018 - summary brief, 2020. Available: <https://mamaye.org/>
- 29 SOML. Save one million lives program for results, 2020. Available: <http://somlpforr.org/ng/>

Annex: Map of change ideas and concepts across 3 quality domains, 7 sub-domains

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1. Quality Impact-better health: 7 problems identified and 30 change ideas tested

Under this domain, number of facilities documented to have identified problems and developed change concepts and ideas during the study period:

- 4 of 6 PHCs (labelled A1, A2, A3, A6)
- 12 of 14 public hospitals (labelled B2, B3, B5, B7, B8, B9, B10, B11, B12, B13, B17, B18)
- 4 of 8 private facilities (labelled C11, C15, C17, C20)

S/N	Problem description	Method of problem identification	Change ideas-change concepts
1	Health workers were not adhering to pre-eclampsia/eclampsia protocol; there was a delay in identifying and referring cases	<ul style="list-style-type: none"> - Facility register/case notes (B2, B5, B7, B9, B10, B12, B18). - Findings from Quality Assurance Exercise (B2, B12, B13), - Staff observation (B13) - MPDSR Fact Sheet (B12) - Observation made by the ministry (B13) 	<ul style="list-style-type: none"> Ensure checklist for tracking adherence is included as the 1st page of severe pre-eclampsia/ eclampsia patient case note-<i>complication management</i> (B2, B5, B7, B9, B10, B11, B12, B13, B17, B18). Sensitise doctors and nurses on the importance of using the checklist and adherence to protocol-<i>complication management</i> (B2, B5, B7, B9, B10, B11, B12, B13, B17, B18) Train/retrain doctors and nurses on the management of severe pre-eclampsia & eclampsia-<i>complication management</i> (B2, B13, B18). Develop and post pictorial protocol on the walls of the labour ward and share easily accessible protocol cards-<i>complication management</i> (B8, B12, B10); (C15) Appoint severe pre-eclampsia/ eclampsia champions who will ensure checklists are used-<i>complication management</i> (B18). Establish a triage protocol to facilitate prompt treatment and early referral-<i>complication management</i> (B5) (C11)
2	Health workers were not adhering to the protocol for managing post-partum haemorrhage (PPH); there was a delay in commencing appropriate care for patients with PPH	<ul style="list-style-type: none"> - From HSDF survey (B13) - Facility register (B11) 	<ul style="list-style-type: none"> Develop a checklist to monitor blood loss and signs of shock as per protocol-<i>complication management</i> (B12, B13) Sensitise labour ward & postnatal ward doctors and nurses on the importance of adhering to PPH protocol-<i>complication management</i> (B11, B12, B13). Senior doctors' daily ward rounds for prompt identification and management of PPH cases-<i>complication identification and management</i> (B11). Consultant OBGYN should be informed of all newly admitted women in labour-<i>complication identification and management</i> (B11). Train all clinical & non-clinical staff, including gatemens, on responding to emergencies such as PPH-<i>complication identification</i> (B11). Make close-user-group phone line available to various service units e.g. laboratory, emergency room, wards etc. to facilitate within-facility communication-<i>complication management</i> (B11)
3	Increase in neonatal deaths from poor adherence to protocol on management of preterm babies; poor competence in neonatal resuscitation and delays in referral	<ul style="list-style-type: none"> - Facility register(B3), - Review of case notes (B3) - Staff observation (B5) 	<ul style="list-style-type: none"> Include a management protocol & checklist in the case folder of preterm babies-<i>complication management</i> (B3) Train health providers regularly on management of preterm as per protocol-<i>complication management</i> (B3)

			Develop a protocol for referral of preterm deliveries- <i>complication management (B5)</i> .
			Train doctors on neonatal resuscitation- <i>complication management (B5, B8)</i>
			Use a checklist to ensure that all steps in neonatal resuscitation are followed- <i>complication management (B5)</i> .
			Educate health providers on the importance of early decisions and referrals- <i>complication management (B5)</i> .
4	Partographs to identify labour complications are not properly filled.	Not documented	Inform the apex nurse to sensitise the labour ward nurses on the importance of filling the partograph properly- <i>complication identification (A1, A2, A3)</i>
			Identify a health provider to train/retrain nurses on partograph use- <i>complication identification (C20)</i>
5	Late identification of births at risk of birth asphyxia	Staff observation (B5)	WhatsApp group to educate pregnant women on signs of labour including danger signs- <i>complication identification (B5)</i> .
			Ensure complete usage of partograph to guide decision making- <i>complication identification (B5)</i> .
6	Increased maternal mortality and neonatal morbidity (e.g., birth asphyxia) from poorly managed complications referred from PHCs and TBAs	- Adopted from another facility (B8) - Facility register (B11)	Visit/create an MPDSR WhatsApp group that includes health providers from the popular sources of referral to enhance communication, thereby enabling prompt referral- <i>complication management (B8) (C17)</i>
			Conduct MNH training of PHC staff and TBAs- <i>complication identification (B8) (C17)</i> .
			Give monetary incentives to TBAs to encourage early referral of pregnant women- <i>complication identification (C17)</i>
			Encourage TBA-registered patients to come for ANC and delivery by promoting affordability through instalment payments- <i>complication identification (C17)</i>
			Educate pregnant women on the importance of delivery at PHC instead of using a TBA-- <i>complication identification (A6)</i>
			Make hospital telephone line available to surrounding PHCs for prompt and seamless referrals- <i>complication management (B11)</i>
			Awareness about 24hrs and weekend services at the PHC to reduce TBA patronage- <i>complication identification (A6)</i>
7	More deaths at night/weekends from delay in identification and management of potential complications because fewer senior doctors, nurses and pharmacists were available then	Not documented	Increase the number of doctors and nurses on night shifts and weekend duties- <i>complication identification and management (B8)</i> .

2. Quality impact-economic benefit: 6 problems identified, 12 change ideas tested

Under this domain, the number of facilities documented to have identified problems and developed change concepts and ideas during the study period:

- 0 of 6 PHCs
- 0 of 14 public hospitals
- 2 of 8 private facilities (labelled C17, C20)

S/N	Problem description	Method of problem identification	Change ideas – <i>change concepts</i>
1	Revenue generation affected by inefficient billing due to non-uniform price of services.	Not documented	Create a uniform price list and post it in doctor's office, ward and pharmacy to prevent underbilling- <i>revenue generation (C20, C17)</i>
2	Inadequate stock taking at the pharmacy causing a disparity in dispensation and stock and consequently unexplainable revenue loss	Routine data (C17)	Develop and implement a drug auditing policy- <i>revenue generation (C17)</i> .
			Only drugs on prescription sheets should be dispensed- <i>revenue generation (C17)</i>
			Introduce stock-taking tools such as bin cards for monthly auditing of drug stock- <i>revenue generation (C17)</i>
			Access to pharmacy should be limited to pharmacy technicians- <i>revenue generation (C17)</i>
3	Patients were being admitted into the ward beyond their health insurance plan limit.	Not documented	Put a code on each admission slip to reflect the appropriate ward per health insurance plan- <i>revenue generation (C20)</i> .
4	Staff members admission into VIP ward limited available bed spaces for patients who require admission	Not documented	Develop and read out admission policy during clinical/staff meeting- <i>revenue generation (C20)</i> .
			Mandate doctors to inform their HODs about their intention to admit a member of staff or staff relative- <i>revenue generation (C20)</i> .
			HODs of department to review admission plan of staff-- <i>revenue generation (C20)</i> .
			Only one VIP ward should be assigned to staff members per time, and hierarchy should be considered- <i>revenue generation (C20)</i> .
5	Inefficiencies due to staff shortage but the cost of employing new staff was too high.	Not documented	Employ trained individuals on national assignment (NYSC) who have requisite knowledge and skills, but salary may be less- <i>revenue generation (C20)</i> .
6	Ordering of multiple investigations despite patients' financial constraints and health insurance limits.	Not documented	Senior doctors to review requested investigations and provide feedback to junior doctors on how to make judgement on the most important investigations- <i>patient financial protection (C20)</i> .

3. Process of care-competent care and systems: 21 problems identified and 40 change ideas tested

Under this domain, number of facilities documented to have identified problems and developed change concepts and ideas during the study period:

- 3 of 6 PHCs (labelled A2, A4, A5)
- 7 of 14 public hospitals (labelled B2, B6, B7, B8, B9, B11, B15)
- 6 of 8 private facilities (labelled C5, C11, C16, C17, C20, C25)

S/N	Problem description	Method of problem identification	Change ideas - <i>change concepts</i>
1	Inappropriate umbilical cord care leading to increased risk of infection as some mothers lack understanding about the correct use of chlorhexidine gel	Not documented	Encourage and train mothers to use chlorhexidine gel for umbilical cord care- <i>disease prevention and health promotion (C17)</i>
			Include chlorhexidine gel as a delivery requirement - <i>disease prevention and health promotion (C17)</i>
			Solicit feedback from mothers on their experience with chlorhexidine through SMS, and WhatsApp platform - <i>disease prevention and health promotion (C17)</i>
			Liaise with apex nurse to facilitate training of nursing mothers on the use of chlorhexidine gel- <i>disease prevention and health promotion (B8)</i>
2	Some health workers do not understand the importance of disease prevention.	Not documented	Health talk on infection prevention and control including handwashing technique- <i>disease prevention and health promotion (A4, A2)</i>
			Train staff on the proper use of colour-coded bins, safety boxes and proper disposal of medical waste- <i>disease prevention and health promotion (A2) (C5)</i>
3	Staff members had needle stick injuries while attending to Hepatitis B positive patient, thereby needing hepatitis B immunoglobulin.	Staff observation (B6)	Deliver health talks to all staff on prevention of needle stick injuries and the need to get vaccinated- <i>disease prevention and health promotion (B6)</i>
			Screen staff for Hepatitis B- <i>disease prevention and health promotion (B6)</i>
			Procure and vaccinate Hepatitis B negative staff against the infection- <i>disease prevention and health promotion (B6)</i>
4	Increasing cases of hospital-acquired infection.	Not documented	Fumigate the ward at stipulated intervals- <i>disease prevention and health promotion (B8) (C20, C5)</i>

5	Hepatitis screening not routinely done during ANC preventing early detection of infection and increasing the risk of transmission to the foetus	Not documented	Develop and adopt a policy on routine hepatitis screening of women who visit the ANC and FP clinics- <i>disease prevention and health promotion (C17)</i> .
			Purchase screening kit and ensure continued availability - <i>disease prevention and health promotion (C17)</i>
			Create awareness about hepatitis- <i>disease prevention and health promotion (C17)</i>
			Referral of patients that test positive for hepatitis and track completion of referral- <i>disease prevention and health promotion (C17)</i>
			Purchase screening kit and ensure availability- <i>disease prevention and health promotion (C17)</i>
6	HIV test not routinely done preventing early detection	Not documented	All patients presenting at the facility should be encouraged to undergo HIV counselling and testing - <i>disease prevention and health promotion (C25)</i>
			Treatment/care/support should be provided for patients that test positive for HIV- <i>disease prevention and health promotion (C25)</i>
7	Poor knowledge of common health conditions among patients; few platforms for health education of patients	Not documented	Encourage health providers to educate patients on prevention of common ailments; provide information on the diagnosis and treatment of ailment they are being managed for; play documentaries on common health topics during peak hours- <i>disease prevention and health promotion (B9) (C11, C5)</i>
			Post bills on notice boards and share pamphlets with health messages- <i>disease prevention and health promotion (B7, B9) (C11)</i>
8	Need to prevent unwanted pregnancies and abortions and improve uptake of services	Not documented	Conduct annual free/subsidised family planning outreaches to create awareness- <i>disease prevention and health promotion (C17)</i>
9	Need to create awareness on cervical cancer to improve uptake of services	Not documented	Conduct annual free/subsidised cervical screening- <i>disease prevention and health promotion (C17)</i>
10	Continuity of care is not ensured. Patient tracking system needs strengthening. Health outcomes not consistently documented because of the non-availability of referral register.	Not documented	Assign officer to track completion of referral over the phone – <i>service uptake and continuity (A4)</i> .
			Inform the M&E Officer to make requisition for referral register or improvise with hardcover notebook – <i>documentation (A4)</i> .
			Send reminder text messages to ANC clients before the date of next ANC visit– <i>service uptake and continuity (B7) (C16)</i> .
11	Increase in under-5 pentavalent vaccine drop out.	Not documented	Identify and track defaulters (that had pentavalent 1 vaccine but missed an appointment for either pentavalent 2 or 3 vaccines) – <i>service uptake and continuity (A2)</i>
12	Need a system for timely action as patients requiring emergency care were sometimes kept in long queues because there is no triage nurse to sort patients based on case severity	Not documented	Advocate to MOH that a triage nurse be assigned to identify patients that would require emergency care– <i>service uptake and continuity (A2)</i>

13	Delay in transporting patients requiring emergency care from car park to emergency room thereby preventing timely action	Safe care recommendation (B15)	Provide an emergency ramp to transport patients requiring emergency care – <i>service uptake and continuity</i> (B15)
14	Decision making is affected by poor documentation leading to under-reporting, e.g., on use of chlorhexidine gel.	Not documented	Educate health providers on the importance of detailed documentation – <i>documentation</i> (A4, A5) (C16)
15	Lack of systematic assessment of patients for complications; conditions not appropriately assessed and managed	Not documented	Write high risk with red pen on the front cover of case folder - <i>documentation</i> (C20)
			Clinical audit of case notes especially patients at high risk of developing complications- <i>documentation</i> (C20)
16	Discharge summaries were not filled. During follow-up visits at the clinic, the doctor has to read through the entire or most part of the case notes to understand patient management during admission. This was affecting decision-making.	Staff observation (B11)	Sensitise the doctors including HODs on the importance of filling the discharge summary – <i>documentation</i> (B8, B11).
			Print more discharge summary forms and head of nurses in each ward should ensure that forms are available – <i>documentation</i> (B11).
			Appoint an officer/champion per ward to ensure summary sheet have been filled - <i>documentation</i> (B11).
17	Patients were not properly clerked	Not documented	Sensitise doctors on the need to clerk patients properly – <i>documentation</i> (B11)
			Develop and disseminate prototype of proper clerking among doctors – <i>documentation</i> (B11)
18	Blood samples were not properly labelled with a risk of mixing up blood samples and consequently results.	Not documented	A memo to be prepared and pasted in the injection room reminding the nurses to label every specimen bottle accordingly and send a notification to nurses on their WhatsApp platform – <i>documentation</i> (C20).
19	Medication errors from wrong prescriptions by doctors.	Not documented	Pharmacist should document and investigate medication errors and check with doctors to ensure wrong medications are not dispensed – <i>documentation</i> (C11)
20	Guidelines needed for management of health conditions	Safe care recommendations (B7)	Develop and disseminate protocols for management of pre-operative conditions – <i>documentation</i> (B7)
21	Need to ensure ease of use of emergency trolley during emergencies	Recommendation by the Lagos State Ministry of Health (B2)	Label content of the emergency trolley - <i>documentation</i> (B2)
			Develop a protocol to guide the use of emergency trolley – <i>documentation</i> (B2)

4. Process of care-positive user experience: 17 problems identified and 44 change ideas tested

Under this domain, number of facilities documented to have identified problems and developed change concepts and ideas during the study period:

- 5 of 6 PHCs (labelled A1, A2, A4, A5, A6)
- 10 of 14 public hospitals (labelled B2, B3, B6, B7, B8, B9, B11, B13, B15, B17)
- 4 of 8 private facilities (labelled C11, C17, C18, C20)

S/N	Problem description	Method of problem identification	Change ideas-change concepts
1	Long waiting time in the facility due to few service points that are far apart. May become worse during the rainy season as there are no roofed walkways between the buildings and people may have to enter the rain to move from one service point to another	Not documented	Relocate clinics to office spaces that are near laboratories and record office- <i>waiting time (A1)</i> Create multiple service point to cater for clinics and wards in different parts of the facility- <i>waiting time (C20)</i> .
2	The patient spend time asking for direction to key service points as there are no signages.	Not documented	Develop signages to direct patients to key service points – <i>ease of accessing care (A2)</i> .
3	Increased waiting time in laboratory due to only one investigation form was being used for haematology, microbiology & chemical pathology. Patients have to join long queues to photocopy and take a copy to each lab.	Not documented	Notify printer to print separate forms for each lab unit – <i>waiting time (B6)</i> .
4	Patients are unsure about the cost of investigation and have to look for additional funds when money is insufficient.	Not documented	Develop and paste laboratory investigation price list – <i>ease of accessing care (B6)</i> .
5	Single phlebotomy point with patients needing to wait in long queues to have their blood sample taken.	Not documented	Create multiple phlebotomy points with more than one phlebotomist at each point – <i>waiting time & ease of accessing care (A2)</i> .
6	Patients were often anxious/agitated because they did not understand that some test such as MCS take 3 days to culture.	Not documented	Communicate average duration of the investigation to each patient- <i>ease of accessing care (B6)</i> .
7	Investigation results had to be typed before being released.	Not documented	Doctors may request for the pre-typed (hand-written) form of the result if results are needed urgently – <i>waiting time (B6)</i> Deploy more admin staff to type and distribute investigation result – <i>waiting time (B6)</i> .
8	Increased waiting time at medical records due to time spent retrieving case notes.	Not documented	Archive old case notes, (case notes of patients that are deceased or have stopped using the hospital – <i>waiting time (B6)</i>)

			Institute electronic medical records – <i>waiting time (A2) (B6)</i>
9	Delay at the clinic due to inadequate number of doctors and nurses.	Patient complaints (B17) Complaint box (B17)	Reduce the number of doctors participating in ward round on clinic days to increase the number of doctors available for clinic consultation– <i>waiting time (B17)</i>
			Ward rounds should be of shorter duration on clinic days– <i>waiting time (B17)</i>
			Mandate doctors to commence consultation by 9.00 a.m. – <i>waiting time (B17)</i>
			Increase number of clinic days per week – <i>waiting time & ease of accessing care (B17)</i>
			Stagger patient clinic appointments to different times of the day and educate patients on need to comply with the appointments/send text to remind them of appointment – <i>waiting time & ease of accessing care (A2, A6) (B13, B7)</i>
			Task shift certain roles to CHEWs such as checking vital signs, administering injection and dressing wounds – <i>waiting time (A4)</i> .
10	Patients go through a long process involving three visits before booking (register pregnancy) for ANC. The community members are not encouraged to attend the ANC clinics at the facility and may not come till delivery.	Facility register (B15)	Introduction of couples' clinic where couples are counselled on the importance of attending a recommended number of ANC clinics and husband is encouraged to donate blood voluntarily- <i>ease of accessing care (B15)</i>
			Health talks at out-patient clinics on the importance and process of registering pregnancy- <i>ease of accessing care (B15) (C18)</i>
11	Husband is expected to donate blood for ANC clients before registering pregnancy.	Facility register (B15)	Booking patients irrespective of whether they donated or not- <i>ease of accessing care (B15)</i> .
12	Processes are expected to run sequentially such that one has to be completed before embarking on the next making it cumbersome	Staff observation (B11)	Allow the processes to run in parallel- <i>ease of accessing care (B11)</i> .
13	Physicians were having to share a room for consultation, thereby compromising patient confidentiality & audiovisual privacy.	Safe care recommendation (B2)	Build additional consultation rooms for consultation- <i>patient dignity (B2)</i> .
14	Need to improve patient involvement and participation in their health care delivery; strengthen the relationship with patients	Patient complaint (C17)	Develop a platform or leverage the QI committee to include one or more patients into the QI team or mini decision-making, e.g., patients-management forum- <i>patients' dignity and staff-patient relationship (C17, C20)</i> .
			Hospital to employ a customer service agent to identify and address patient needs and expectations- <i>patients' dignity (C20)</i>
			Train staff on patient rights and customer relations- <i>patient dignity and staff-patient relationship (B3, B15) (C17, C18)</i>

			Birthday greetings to patients- <i>patients' dignity and staff-patient relationships (C11)</i>
15	Patients complained about poor staff attitude.	Patient satisfaction survey (B7, B9, B11)	Educate staff on the importance of having a positive attitude towards patients- <i>staff-patient relationship (B7, B9, B11)</i>
16	Poor level of cleanliness within the facility. Water-logged toilets that were not regularly cleaned. Poor patient satisfaction due to poor state of the ward and environment. Untidy service areas because some housekeeping staff were not performing assigned duties. Patient wards were not conducive for habitation because of mosquitoes	Patient satisfaction survey (B15, B17) Patient complaint (C20)	Get management buy-in and advocate to them to address plumbing issues- <i>clean and conducive environment (B15)</i>
			Develop cleaning roster and supervisors should monitor compliance of cleaners- <i>clean and conducive environment (B15) (C11)</i> .
			Constitute a committee to look into cleanliness of hospital environment - <i>clean and conducive environment (B17)</i>
			Renovate wards and clinics- <i>clean and conducive environment (B17) (C17, C20)</i>
			Caution erring housekeeping staff- <i>clean and conducive environment (C20)</i>
			A copy of housekeeper's job allocation and phone numbers should be pasted at each nursing station to know erring housekeepers- <i>clean and conducive environment (C20)</i> . Train cleaners - <i>clean and conducive environment (B8)</i>
			Install electronic insect killer in the wards/periodic use of insecticides in the ward - <i>clean and conducive environment (C20)</i>
17	Patients complained about the quality of food served. Plausible reasons included inadequate training of cooks, no functional diet committee, non-availability of some equipment, lack of variety of meals, patients on special diets not enlightened	Patient complaint (B8) Staff observation (B8)	Train all cook- <i>quality meals (B8)</i>
			Place catering officers on weekend calls - <i>quality meals (B6)</i>
			Mandate catering officers to fill an attendance sheet to track compliance with weekend calls- <i>quality meals (B6)</i> .
			Refurbish the kitchen and its call room- <i>quality meals (B6)</i> .
			Constitute a diet committee- <i>quality meals (B6)</i>
			Provide the requisite kitchen equipment, ingredients and utensils- <i>quality meals (B6, B8)</i> .
			Develop and post a food menu that reflects variety- <i>quality meals (B8)</i>
			Enlighten patients on special diets (e.g., diabetics) that their meal may taste different- <i>quality meals (B6)</i> . Assign someone to taste the food before it is served- <i>quality meals (B8)</i>

5. Foundations- governance: 1 problem identified and 1 change idea tested

Under this domain, the number of facilities documented to have identified problems and developed change concepts and ideas during the study period:

- 0 of 6 PHCs
- 1 of 14 public hospitals (labelled B15)
- 0 of 8 private facilities

S/N	Problem description	Method of problem identification	Change ideas – <i>change concepts</i>
1	Need to get management's political commitment for the selected change ideas	1. Recommendation by Safe care initiative (B15)	QI reports, including change ideas are to be reviewed at Management meetings- <i>buy-in of the management</i> (B15).

6. Foundations- workforce: 8 problems identified and 11 change ideas tested

Under this domain, the number of facilities documented to have identified problems and developed change concepts and ideas during the study period:

- 1 of 6 PHCs (labelled A2)
- 2 of 14 public hospitals (labelled B12, B18)
- 3 of 8 private facilities (labelled C15, C20, C25)

S/N	Problem description	Method of problem identification	Change ideas-change concepts
1	Non-QI staff members were demotivated from the additional documentation and activities required by QI as it was considered a major contributor to workload.	Not documented	Institute monetary awards to best junior and senior staff that have been supportive of QI activities as well as compliance with standards of practice in the facility- <i>staff welfare</i> (C25).
2	Shortage of doctors in the facility as doctors often reject posting to the facility because of its remote location and poor state of the roads leading to the area.	Not documented	Renovate staff quarters to accommodate newly posted doctors to forestall the need to travel to work- <i>staff welfare</i> (B12).
3	To ensure continued commitment of QI team members.	Not documented	Giving of incentive to all QI members- <i>staff welfare</i> (B18)
4	Complaints that staff should have rights	Not documented	Staff rights should be written alongside patient rights- <i>staff welfare</i> (C20).
			Develop a platform such as suggestion box where staff members can provide suggestions or complain - <i>staff welfare</i> (C20).
5	Lack of cordial relationship among staff with frequent disagreement between staff members.	Not documented	Create a WhatsApp group for staff members to interact- <i>staff welfare</i> (C15).
6	Staff lateness was contributing to delay in attending to patients	Not documented	Provide staff attendance registers in all units to track staff punctuality- <i>staff discipline</i> (A2) (C15).
			Institute staff disciplinary committee to review staff conduct and make recommendations- <i>staff discipline</i> (C20)

7	Problem with proper handing over of shift duty with instructions not being passed on from one shift to the other.	Not documented	Handing over of shift duty should be documented- <i>staff discipline (C25)</i> . Ensure hand over of communication materials e.g. mobile phone- <i>staff discipline (C15)</i>
8	Some staff were not wearing decent attires with others refusing to wear ward coats.	Not documented	Images of decent dressing should be shared among staff and memo reiterating the importance to be shared to all departments- <i>staff discipline (C20)</i> Staff refusing to wear ward/lab coats should be identified by designated staff members with the aim of calling them to order- <i>staff discipline (C20)</i>

7. Foundations- tools: 10 problems identified and 19 change ideas tested

Under this domain, the number of facilities documented to have identified problems and developed change concepts and ideas during the study period:

- 4 of 6 PHCs (labelled A1, A2, A3, A5)
- 6 of 14 public hospitals (labelled B3, B6, B7, B10, B12, B18)
- 2 of 8 private facilities (labelled C15, C20)

S/N	Problem description	Method of problem identification	Change ideas-change concepts
1	Unavailability of fresh blood in the blood bank including O+ve blood (universally accepted blood group) due to government policy that blood donation should be voluntary.	Facility register (B3, B10)	Sensitise facility staff & host community members (including religious houses) on voluntary blood donation- <i>availability of commodities</i> (B3, B7, B10).
			Provide donor incentive e.g. blood tonic - <i>availability of commodities</i> (B3, B7, B10)
			Print and disseminate flyers & posters on the importance of blood donation- <i>availability of commodities</i> (B3, B7).
			Collect blood from other facilities - <i>availability of commodities</i> (B3).
			Establish a blood transfusion committee to oversee blood transfusion in facility- <i>availability of commodities</i> (B3, B7, B12).
			Generate a directory of voluntary donors, especially those that are O positive - <i>availability of commodities</i> (B3).
2	Poor availability of supplies required for the management (adherence to protocol) of severe pre-eclampsia/eclampsia	Not documented	Prepack and supply drugs for eclampsia management ("Eclampsia pack") - <i>availability of commodities</i> (B18)
3	Stockout of drugs at the pharmacy because of inefficiencies of the new pharmacy staff	Not documented	Inventory taking should be done by a staff with requisite skills in stock taking- <i>availability of commodities</i> (C20).
			Prompt reordering of drugs to prevent stockout - <i>availability of commodities</i> (C20).
4	The need for good Ambu bag as the available does not fit well with the oxygen connector.	Not documented	Get a good Ambu bag and a connector to attach it to oxygen supply - <i>availability of equipment</i> (C15).

5	The need to promptly identify faulty equipment and repair accordingly as it was contributing to waiting time	Not documented	Send a memo to inform staff to document faulty equipment in their respective departments - <i>availability of equipment (C20)</i>
			Employ a facility manager to facilitate fixing/replacement of faulty equipment identified in the various departments- <i>availability of equipment (C20)</i>
			Meet with head of engineering to repair faulty equipment and install the new machine- <i>availability of equipment (B6)</i> .
6	Inadequate number of vital sign equipment often means that nurses have to take turns to use the available equipment, consequently increasing waiting time	Not documented	Purchase more BP apparatus, weighing scale and thermometers - <i>availability of equipment (A1)</i>
7	Non-availability of wash hand basin with taps, no disposable hand towels to dry hands after washing to prevent the spread of infection	Not documented	Purchase more Veronica buckets with stands and bowls for handwashing - <i>availability of equipment (A2)</i>
8	Non-availability of running water during a power cut when the water pumping machine cannot be powered	Not documented	Purchase a storage tank to store pumped water such that water is available for longer- <i>availability of utility (A3)</i>
9	Inadequate power supply affecting service delivery	Not documented	Purchase a generator to power service units - <i>availability of utility (A5)</i>
			Purchase and use machines that don't rely on electricity- <i>availability of equipment (A2)</i> .
10	Inadequate power supply making it difficult to power laboratory equipment.	Not documented	Connect all lab equipment to facility generator- <i>availability of utility (A5)</i> .