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COMMENTARY

Learning Health Systems

Transforming district health systems into learning health systems: An improved strategy from the District.Team experience in Benin and Guinea

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Abstract

District Health Systems (DHS) are essential for delivering healthcare services, particularly in low- and middle-income countries. However, they often struggle with inefficiencies, inadequate data utilization, and limited learning capacity. Transforming DHS into Learning Health Systems (LHS) offers a strategic pathway to strengthening health systems governance, improving service delivery, and fostering continuous adaptation. This paper draws insights from *District.Team*, a digital learning platform piloted in Benin and Guinea in 2016–2017, designed to enhance real-time knowledge exchange and decision-making among District Health Management Teams (DHMTs). The *District.Team* strategy employed structured learning cycles to address key health system challenges, including maternal deaths surveillance and response and epidemiologic preparedness. The platform enabled peer-to-peer learning, facilitated data visualization, and encouraged collaborative problem-solving. Participation rates of district medical officers (DMOs), the heads of DHMTs, remained high across the five learning cycles in each country. For instance, during Cycle 1 (district health system characteristics), 85% (29/34) of DMOs in Benin and 100% (38/38) in Guinea completed the online questionnaire, with active engagement in online discussions. By the final cycle (maternal deaths surveillance and response), 61% and 74% of DMOs in Guinea participated in questionnaire filling and discussions, while in Benin, 44% contributed to the online discussions. DMOs reported improved decision-making processes, enhanced engagement with health data, and strengthened collaboration. Despite its successes, the District.Team strategy faced challenges such as limited integration into national health programs, weak institutional support, time constraints for DMOs, and infrastructural limitations, including unreliable internet connectivity and electricity shortages. Building on lessons learned, an improved strategy, referred to as *District.Team*$^{+}$, is proposed to ensure sustainability and scalability. *District.Team*$^{+}$ incorporates a knowledge translation component, aligns with national health information

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systems (e.g., DHIS2), allows for the conduct of research or integration of existing research, and expands the learning community to include policymakers, healthcare providers, and communities. It aims to strengthen evidence-based practice and decision-making, practice-informed policymaking, and adaptive health management within health systems. *District.Team*$^{+}$ highlights the potential of digital learning platforms to support the transformation of DHS into LHS, provided they are embedded in national structures, adequately resourced, and aligned with broader health system priorities.

KEYWORDS
digital platforms, district health systems, District.Team, learning health systems

1 | BACKGROUND

District health systems (DHS) play a pivotal role in delivering essential health services, especially in low- and middle-income countries.[1,2] However, many DHS face persistent challenges, including inefficiencies, limited capacity for learning and adaptation, and suboptimal use of data for decision-making. Transforming DHS into learning health systems (LHS) offers a strategic approach to improving health outcomes through continuous learning, evidence-informed decision-making, and adaptive management.[3] The Lancet Global Health Commission on high-quality health systems highlighted the importance of learning[4]—particularly when led by DHS—in ensuring the delivery of high-quality healthcare. The World Health Organization's Alliance for Health Policy and Systems Research has further asserted that learning is "fundamental for strengthening health systems and achieving health goals".[3] DHS provide essential foundations for learning by drawing on multiple sources of knowledge.[5] These include quantitative data collected locally (hard data), first-hand lived experiences (warm data), and insights into local contexts and realities (soft data). Additionally, their close ties with communities and broad networks of relationships create opportunities for deeper engagement. When these diverse elements are effectively integrated, they can foster innovative ways of improving healthcare services while also driving new and transformative learning processes.

In recent years, many scholars and practitioners have increasingly focused on operationalizing learning health systems, seeking the most actionable and contextually relevant strategies and frameworks.[6–11] In this paper, we present a case for an improved strategy on transforming DHS into LHS, based on our previous experience with "District.Team" in Benin and Guinea in 2016–2017. First, we provide an overview of District.Team; explain why we focus on DHS, digital tools, and learning; and summarize what worked and what has not through District.Team. Second, we highlight what we learned from District.Team. Third, we outline the improved strategy.

2 | WHAT WAS DISTRICT.TEAM ABOUT?

District.Team was a component of the eHealth initiative titled *"Mobilization 2.0 of district health management teams (DHMTs) to fight against outbreaks and other emerging health issues,"* conceived by the *Health Service Delivery Community of Practice*, of which we [the authors] were members.

It was a facilitated web-based platform that combined local data visualization and peer-to-peer discussions to foster learning among DHMTs led by District Medical Officers (DMOs).[12–14] The District.Team web platform was designed by Bluesquare, following principles for effective online platforms outlined by Blank and Dorf.[15] Built using a simple WordPress blog, it featured three main components: a landing page listing the last blog posts (with space for comments), an online discussion forum open to DMOs, and a short presentation of the project (Figure 1). The core assumption behind *District.Team* was that a strategy enabled by information and communication technologies (ICTs) could support real-time knowledge exchange among DHMTs and ultimately enhance district health system performance. Due to the project's time constraints, a rapid iterative approach was employed. District.Team was piloted across all 34 health districts in Benin and all 38 health districts in Guinea in 2016–2017, with funding from the UNICEF West and Central African Regional Office. It was coordinated in Benin by KOAB and JPD, and in Guinea by TMM and AD.

District.Team followed learning cycles during implementation. In each country, **five learning cycles** were carried out by the project team. **Cycle 1** focused on district health system characteristics (such as the population size, the number of health areas, and the availability of electricity and the Internet); **Cycle 2** explored the management of human resources for health; **Cycle 3** started with an online discussion on performance-based financing in Benin and on obstetric fistulae in Guinea; for both, we used results of published reports in Benin[16] and studies in Guinea[17,18]; **Cycle 4** was on epidemiologic surveillance in both countries; and **Cycle 5** analyzed the maternal death surveillance and response in both countries but started in Guinea with data collection through an online questionnaire[13] and in Benin with the online discussion. Each learning cycle comprises **five major steps** (Figure 2). These are—(1) Identification of a health issue to investigate—(2) Elaboration of the online questionnaire—(3) Administration of the questionnaire—(4) Data analysis, production, and publication of results—(5) Online discussion forum on results.

FIGURE 1 Guinea's District.Team platform, 2016–2017. (http://guinee.district.team/, currently unavailable)

3 | WHY FOCUS ON DISTRICT HEALTH SYSTEM, DIGITAL TOOLS, AND LEARNING?

Several key events happening in global health over time have inspired the conceptualization of "District.Team" with a focus on DHS, ICTs (digital tools), and learning (Figure 3). These include— (1) The Harare declaration (Zimbabwe, 1987) following the Alma Ata "health for all" movement (Kazakhstan, 1978), which was a key milestone that established and gave political endorsement to the health district as the backbone of primary health care— (2) The Dakar conference (Senegal, 2013) held on the 25th anniversary of the Harare Declaration, where participants re-confirmed the validity of the DHS approach but also highlighted a need for a renewed vision[19]; they proposed 12 key priority actions, among which the use of ICTs to enhance governance and accountability, equity, effectiveness, and efficiency of health districts (10th priority), and the promotion of constant learning at the health district level to adapt strategies and interventions to their specific, complex, and constantly changing environment (11th priority)[20]— (3) The Cotonou workshop (Benin, 2015) following the Dakar conference, where reflections were deepened on the earlier mentioned 10th and 11th priorities as they are closely interconnected. It was assumed that ICTs offer new opportunities capable of transforming health information systems not only to feed limited informed decision-making at the central level but also to allow evidence-informed decision-making at the health district level. Hence, considering the 10th and 11th priorities, District.Team was developed. In addition, the District.Team learning perspective is in accordance with Garvin's definition of a learning organization—an organization skilled at creating, acquiring, interpreting, transferring and retaining knowledge, and at purposefully modifying its behavior to reflect new knowledge and insights.[21] Equally, with District.Team, epistemic learning (by valuing data, with analysis and high-quality visualization) was combined with reflexive learning (online discussion forum among DHMTs).[22]

Moreover, learning through District.Team aligns with the three learning dimensions in health systems as conceptualized by the World Health Organization's Alliance for Health Policy and Systems Research.[3] These are—means of learning, where learning can occur through information, deliberation, and action—learning across levels, where learning happens at individual, team/group, organizational, and cross-organizational levels—and learning loops, where learning takes place through single, double, and triple loops.[3,23] Besides, it is noteworthy that over the past decade, there has been a growing interest in learning health systems[2,14,24–36] indicating that learning is instrumental to health systems performance.

4 | WHAT WORKED AND WHAT HAS NOT THROUGH DISTRICT.TEAM?

District.Team was initiated in an epidemic context in both countries in 2016, Ebola Virus Disease in Guinea and Lassa Fever in Benin. Learning occurred in settings where mobile phone and internet connections were often unreliable. The District.Team learning strategy was implemented using an action research design and a mixed methods approach, combining quantitative and qualitative data to monitor its implementation and evaluate its outcomes. Quantitative data were routinely collected throughout the implementation period via the District.Team platforms, including WordPress activity logs and Google Analytics. In addition, qualitative data were gathered through nine focus group discussions and 18 semistructured in-depth interviews with DMOs, conducted during five regional workshops in Benin and four in Guinea, held at the end of the initiative in June 2017. KOAB and TMM led the qualitative data collection in Benin and Guinea, respectively. Below, we present a synthesis of what worked well and what did not in the District.Team experience, drawing on insights from the monitoring and evaluation process.

Legend of Figure 2	
Step	Details on how each step functioned
1	The health issue was purposely identified either by the research/facilitation team or by the DMOs (e.g. the fifth cycle on maternal deaths surveillance and response), based on the principle of the majority.
2	The questionnaire was developed by the facilitation team in relation with the national guidelines aiming to document the practices on the field and to explore resources, activities, and processes needed for optimal response to a specific health issue by the DHMTs. The online version of the questionnaire was developed using the Google form tool. The number of items in the questionnaire depends on the issue to investigate and the guidelines.
3	The link to the online questionnaire was sent by email to DMOs for them to complete the questionnaire. Additionally, phone calls and SMS were used to interact with DMOs.
4	Data were further analyzed and visualizations were produced by the facilitation team. The online assessment of the capacity of the district health systems to address the health challenge unveiled both their weaknesses and strengths. The visualizations were tables, graphs, maps, or illustrations built using D3js (https://d3js.org/) and Carto (https://carto.com/) software. The visualizations were published online on country platforms. Each country had its platform to facilitate in-country interaction and exchange.
5	DMOs were invited to comment on the results and to share their experience and thoughts. Discussions were guided by the facilitation team. Facilitators summarized the key lessons of the cycle that were also used to improve the following cycle and propose solutions to address the challenges.

FIGURE 2 District.Team learning framework (2016–2017).

4.1 | What worked

1. Sustained participation: Participation rates remained high across the five learning cycles in each country. For instance, during Cycle 1 (district health system characteristics), 85% of DMOs in Benin, and 100% in Guinea completed the online questionnaire, with active engagement in online discussions. By the final cycle (maternal deaths surveillance and response), 61% and 74% of DMOs in Guinea participated in questionnaire filling and discussions, while in Benin, 44% contributed to the online discussions.
2. Enhanced learning among DHMTs: Learning occurred at both individual and team levels, spanning information exchange, deliberation, and single-loop learning, thereby strengthening the learning capabilities of DHMTs (Figure 4).

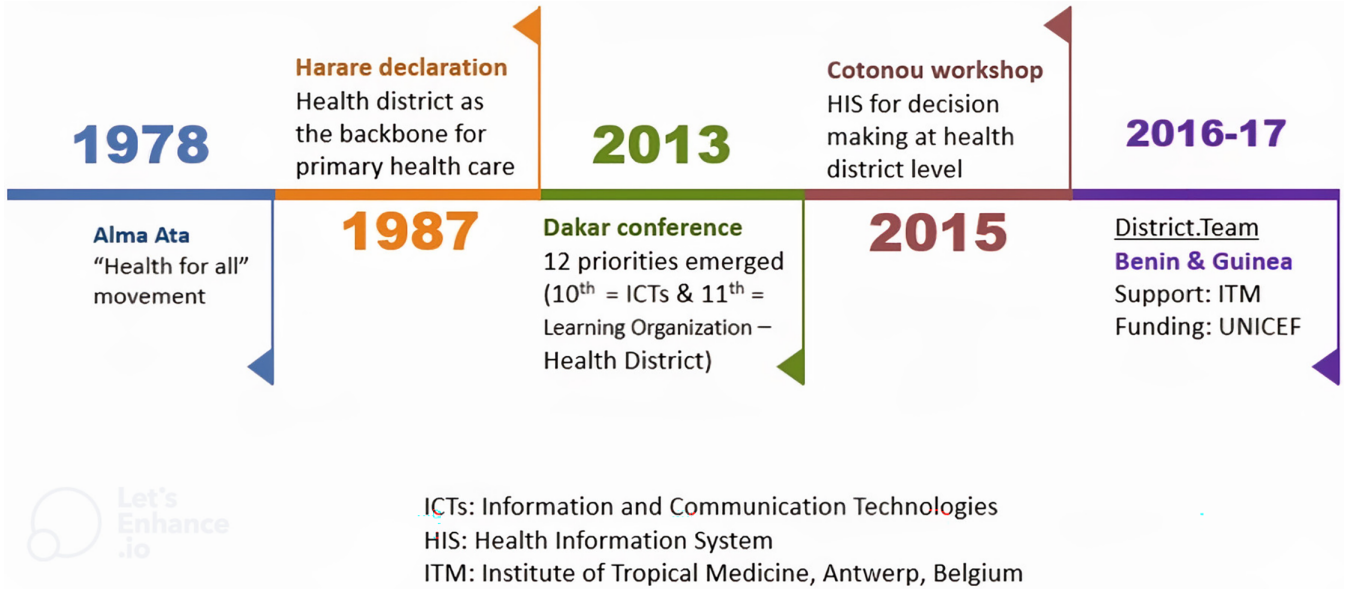

FIGURE 3 Key events inspiring the development of District.Team.

	Learning dimensions								Benefits of learning			Building learning health systems	
	Learning levels		Learning loops			Means of learning							
	Individual and team	Organisation and cross-organisation	Single loop	Double loop	Triple loop	Information	Deliberation	Action and practice	Improved system functions	Adaptivity and innovation	Self reliance	Institutionalising learning	Optimising learning capabilities
District.Team (2016-2017)													

FIGURE 4 Learning dimensions, aspects, and construction through District.Team.

3. Positive perception of data analysis and visualization: DHMTs recognized the impact of data visualization on their decision-making processes. As one DMO from Benin stated: *"Thanks to data visualization, we identified the gaps in our district's preparedness (for the cholera outbreak). This allowed us to readjust the stock of drugs."*
4. Improved knowledge of health issues and challenges: Engaging with peers from other districts during online discussions deepened DHMTs' understanding of health system challenges. A DMO from Guinea noted: *"The theme on the management of human resources was very interesting, essential, and relevant, as only 4 out of 30 positions are filled by the government. We were keen to know what the situation in other districts was."*
5. Effective facilitation and trust building: The availability of a facilitation team provided guidance for DHMTs, while periodic face-to-face meetings fostered trust both among DHMTs and between them and the facilitation team.
6. District.Team as an innovative and user-friendly platform: The platform facilitated data sharing and contributions from members, enhancing transparency and accountability in district health system management, as highlighted by DHMTs.
7. Strengthened DHMTs capabilities through data engagement and knowledge sharing: The platform fostered peer-to-peer learning, as one DMO from Benin noted: *"With District.Team, we became aware that each DMO has developed specific skills and competencies, and we could learn from each other."* For example, a DMO from Benin said: "Thanks to data visualization, we identify weaknesses in our districts and try to address those that are under our responsibility"; or "In my district, due to the cycle on disease surveillance, we analyzed our situation and improved our preparedness to cholera outbreak (DMO from Guinea)."
8. Virtual and asynchronous accessibility: The platform's flexibility was widely appreciated, as it allowed members to access it anytime

and anywhere via the internet. A DMO in Benin emphasized: *"There are fewer face-to-face meetings; you do not need to travel to participate."*

9. Growing interest from subnational and central officials: Although engagement from higher-level officials was initially limited, their increasing interest reflects the relevance and impact of District.Team. A regional health inspector in Guinea highlighted the need for improved dissemination of maternal deaths surveillance and response guidelines, stating: *"Health districts should build on the gains of District.Team to mainstream the use of computer equipment and digital documentation."* Similarly, in Benin, the Ministry of Health leveraged District.Team to facilitate bottom-up participation of DHMTs in the development of the national maternal deaths surveillance and response plan (2017–2022).

4.2 | What has not worked

1. The failure to integrate District.Team into existing health programs and HIS platforms led to a gradual decline in participation. DHMTs struggled to allocate time and secure support from supervisors. All DMOs reported that the key barriers to participation were time constraints and competing demands from subnational and central staff, vertical programs, and financial and technical partners. As a result, DMOs often resorted to using their free time to engage with District.Team.
2. The lack of mainstream support for District.Team within the national health system, as acknowledged by many DMOs, undermined their confidence in sharing opinions in a public forum. A DMO from Benin noted, "What was lacking was the participation of the central level; if my hierarchy is not interested in this project, why should I?"
3. The inconsistent synthesis of lessons learned during some learning cycles was a significant weakness in facilitation. The facilitation team only published a blog summarizing the main outcomes and offering suggestions for performance improvements for learning cycles 3, 4, and 5, leaving earlier cycles without adequate feedback.
4. The absence of follow-up on the application of solutions to the problems affecting DHS performance, as identified during the learning cycles, further hindered progress.
5. Poor infrastructure, including irregular electricity supply and unstable, low-quality internet connections, posed major barriers to participation. One DMO from Guinea shared, *"The quality of the internet connection limited my participation. As for electricity, I don't even have it; I rely on a generator that consumes 20 liters of fuel per day, but I don't receive any subsidy."* Another DMO from Guinea explained, "*Sometimes, the electronic system fails, and my office computer shuts down, causing me to lose my progress."*
6. The short implementation period of 14 months for District.Team limited the ability to assess its health system-wide effects.

In the following section, we reflect on key lessons from the District.Team experience.

5 | WHAT DID WE LEARN FROM DISTRICT.TEAM (TRIPLE-LOOP LEARNING)?

Triple-loop learning often refers to as "learning how to learn," despite the limited consensus among scholars about its definition.[37] It involves questioning the basic learning frameworks and assumptions through which single- and double-loop learning occur and influencing them to change. It improves how the system learns through deliberate changes in or producing new learning contexts, frameworks, structures, and processes.[38–41]

We learned that—learning strategies should be implemented over an extended period of time (at least 4 years) to deliver assessable health system-wide effects—these strategies should incorporate knowledge translation to advocate the use of generated knowledge, monitor its application in practice and policy, and evaluate the resulting effects—the sustainability and effectiveness of learning strategies depend significantly on investing in the facilitation capacity and gaining ownership from national health system authorities (leadership from legitimate authorities)—targeted participants (e.g., DHMTs) should be involved in (or exclusively in charge of) the selection of issues to be investigated for greater ownership of the process—data-driven learning strategies should ideally be integrated into the routine management of the health system, at all its different levels (but not as a parallel strategy to the routine health information system).

Our triple-loop learning from the District.Team experience is reflected in the improved strategy presented in the next section. This improved strategy offers strong potential for scale-up, particularly in light of current conducive conditions. These include: 1) political goodwill for national health system reform in countries such as Benin and Guinea; 2) growing interest in digital health innovations; 3) increased demand for evidence-based progress assessment and decision-making; and 4) heightened momentum around learning health systems among a wide range of national and international stakeholders—including Ministries of Health (e.g., in Benin and Guinea), UNICEF, the World Health Organization, the Global Fund, IntraHealth International, and the World Bank.[3,42–46]

6 | DISTRICT.TEAM^{+}: THE IMPROVED STRATEGY

The improved strategy, referred to as *District.Team*$^{+}$, proposes an improved learning framework (Figure 5), developed by TMM to address challenges with using District.Team. This framework includes a step on knowledge translation and the use of data from the District Health Information System (DHIS2), given that DHIS2 serves as the primary routine health information system in several countries, such as Benin and Guinea. Leveraging DHIS2 data would be conducive to the institutionalization and integration of *District.Team*$^{+}$ into existing

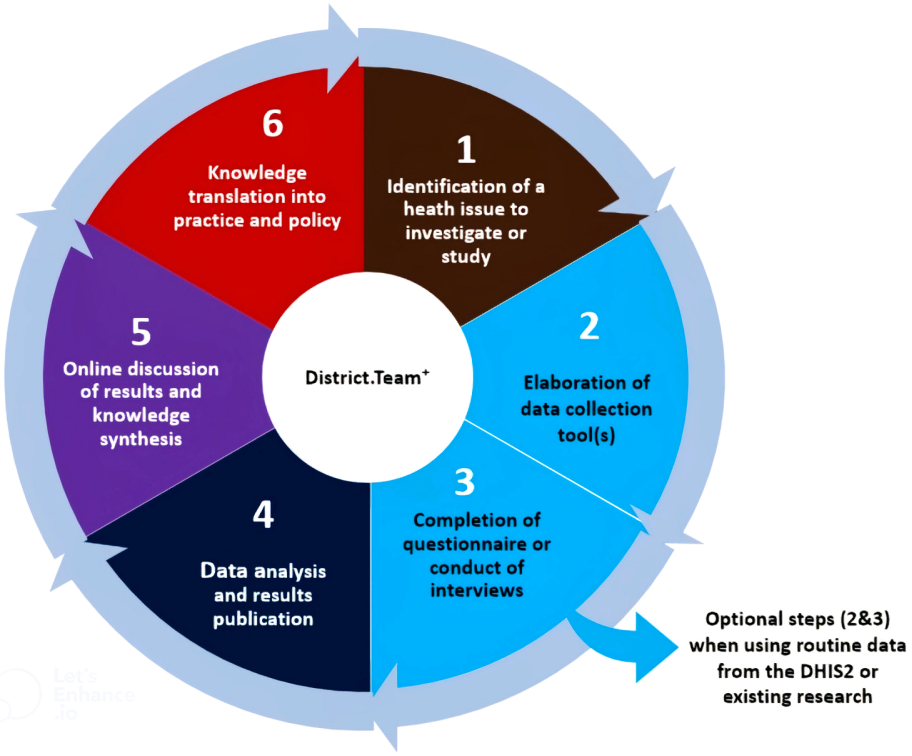

FIGURE 5 District.Team improved learning framework (District.Team^{+}).

health programs. In addition, although *District.Team*$^{+}$ primarily targets DHMTs, it also includes other key stakeholders such as end users, service providers, health committees, health program management teams, regional and central-level staff, and partners. *District.Team*$^{+}$ comprises six steps which are—(1) Identification of the health issue to investigate/study—(2) Development of the survey questionnaire or interview guide—(3) Online questionnaire completion or field interviews—(4) Data analysis and results publication—(5) Online results discussion and knowledge synthesis—(6) Knowledge translation into practice and policy. Each step will function as follows:

Step 1 This initial step involves DHMTs, district hospital managers, health committees, and health program managers, with the participation of staff at subnational and central levels, partners, and the facilitation team. The investigation of certain issues will involve using routine data from DHIS2 or existing relevant research, including evidence syntheses; in such cases, steps 2 and 3 are optional. However, for other issues or questions for which no contextually relevant research is available, different research approaches can be necessary, including operational research (operational or service delivery-related issues), implementation research (implementation-related questions), or health system research (health system-related issues).

Step 2 This is done by the facilitation team with contributions from stakeholders, particularly DHMTs and health program managers. This step is optional when using routine data from DHIS2 or existing research.

Step 3 Depending on the issue to be addressed, the questionnaire may target DHMTs, health committees, and/or health program managers. Monitoring of completion is done through emails, SMS, and phone calls. Some issues will require field data collection via questionnaires or interviews; this will involve health service users and providers and/or other stakeholders (ethics considerations must be followed, and any relevant concerns should be discussed prior to data collection). This step is also optional when using routine data from DHIS2 or existing research.

Step 4 This step is primarily carried out by the facilitation team. Optionally, it may be managed by DHMTs and health program managers with strengthened analysis and blog writing capacities. The results generated are published on the digital platform in the form of a blog that will contain "right" discussion questions (e.g., How can DHMTs integrate community perspectives to improve respectful maternity care?). Those questions must align with learning loops—Are we doing things right? (single-loop learning)—Are we doing the right things? (double-loop learning)—How do we decide what is right? (triple-loop learning).

Step 5 Discussions are led by the facilitation team on the digital platform. Stakeholders are invited to discuss questions addressing bottlenecks or emerging issues in the published blog. They will integrate information, action, and deliberation—combining routine and statistical data with experiential knowledge gained through learning by doing, seeing, or feeling, as well as the broader tacit knowledge needed to interpret hard data. They will identify processes that facilitate learning among individuals

and DHMTs within or across health districts. This approach will support not only adaptations of existing practices (single-loop learning) but also the development of new ways of functioning (double-loop learning) and transformative learning that can reshape entire district health systems (triple-loop learning). Knowledge is regularly synthesized (according to different audiences) and published on the same platform. Additionally, other communication channels (e.g., media, workshops, etc.) are used for certain audiences, notably health service users and providers, to facilitate the translation of knowledge into practice and policy.

Step 6 This step targets health service users and providers, health committees, district hospital managers, DHMTs, health program managers, and policymakers. Advocacy by the facilitation team, DHMTs, program managers, and staff at regional and central levels, who participate in cycles, may be necessary for the application of the knowledge generated. Monitoring and evaluating the effects and impact of knowledge application on population health outcomes are conducted by DHMTs, program managers and the facilitation team.

7 | CONCLUSIONS

District.Team^{+} offers a comprehensive and innovative strategy to learning within [district] health systems. It incorporates a knowledge translation step and the use of DHIS2 routine data; allows for the conduct of research or integration of existing research; expands the learning community to include health service users, providers, and district hospital managers; and stresses learning loops to guide the formulation of discussion questions on key issues. This enhances knowledge management, fosters learning health systems, and cultivates collective intelligence within resource-constrained health systems. Opportunities exist for facilitating peer-to-peer knowledge exchange among DHMTs and implementing more *bottom-up* approaches to tackle health system issues and challenges. *District.Team*$^{+}$ drew on lessons learned from the experience in both Benin and Guinea. Institutionalizing *District.Team*$^{+}$ in countries such as Benin and Guinea would promote evidence-based practice and decision-making, as well as practice-informed policymaking. The success of *District.Team*$^{+}$ strongly rests on investing in facilitation capacity and institutional support.

AUTHOR CONTRIBUTIONS

TMM developed District.Team^{+} and drafted the manuscript. KOAB, JPD, AD, and BM reviewed the manuscript. All authors read and approved the final manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

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