Hindawi
Advances in Public Health
Volume 2019, Article ID 7579569, 9 pages
https://doi.org/10.1155/2019/7579569

Research Article

The Role of Quality Improvement Process in Improving the Culture of Information among Health Staff in Ghana

Richard Okyere Boadu [1], **Godwin Adzakpah** [1] **and Peter Agyei-Baffour** [2]

[1]*Department of Health Information Management School of Allied Health Sciences, College of Health and Allied Health Sciences, University of Cape Coast, Cape Coast, Ghana*
[2]*Department of Health Policy Management & Economics, School of Public Health, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana*

Correspondence should be addressed to Richard Okyere Boadu; richard.boadu@ucc.edu.gh

Received 6 May 2019; Accepted 30 July 2019; Published 27 October 2019

Academic Editor: Giuseppe La Torre

Background. Over the past decades, knowledge and understanding have grown regarding the role that health information systems play in improving global health. Even so, using data to make evidence-informed decisions is still weak in most low- and middle-income countries. People do not always act on what they are told to do but act on sharing what is important and valued in an organization. Shared principles related to information systems are alluded to as a pre-existing culture of data collection or "culture of information" without specifying how these values originate and sustain themselves. They work in an organizational environment, which ultimately impacts them through organizational directives, principles, and practices. The objective of the study was to determines the role of quality improvement process in improving culture of information among health staff in Ghana, particularly in the Ejisu Juaben Health Service over time. *Methods*. A quasi-non-experimental pre- and post-intervention study was conducted in 26 health facilities in the Ejisu Juaben municipal health service of Ghana. The study involved assessment of perceived culture of information of staff coupled with training of 141 core staff selected from 26 facilities who were involved in data collection and use of information through application of data quality improvement training module over a twelve-month period. *Results*. Overall perceived promotion of culture of information improved from 71 percent in the baseline to 81 percent in the endline. Test-retest analysis suggested that the mean levels of the indices measuring promotion of a perceived culture of information, was significantly higher in endline compared to the situation in baseline. *Conclusions*. The study concluded that the improvement in staff perceived culture of information improved significantly overtime and this might have been contributed by the application and adoption of quality improvement training.

1. Introduction

Over the past decades, knowledge and understanding have grown regarding the role that health information systems play in improving general health. Even so, using data to make evidence-informed decisions is still weak in most low- and middle-income countries. This is particularly true for data produced by routine health information systems [1]. Routine Health Information System (RHIS) users work in an organizational setting. This induces them through principles, practices and organizational directions [2]. The health services system is the organizational setting and it can be managed by either the public or private sector. The following organizational factors are recounted in the information system literature: insufficient human and financial resources, minimal management support as well as lack of supervision and leadership. Apparently, these factors are common to health facilities in Ghana [3–6]. For example, in Ghana, the old vertical management structure of the Health Service has led to a status quo where information is mostly generated within departments and along programme lines to fulfilled specific requirements. This may be viewed as legacy of old civil service system where managers collect information at the lower levels for the purpose of transmission to the centre. This has brought with it a number of constraints in the way of information is handled and used:

(i) the proliferation of data collection tools which managers at higher levels finds not very relevant

(ii) an uncoordinated information system (even though it has been improved to some extent with the introduction of web-based database—District Health Information Management Systsem—DHIMS2) which is overwhelmed by data demand from higher levels with virtually no feedback

(iii) the very little priority given to using data for planning and decision making at the lower levels

(iv) the very poor linkage between the various system for data collection, leading to duplication of and inability to assess performance [7].

The PRISM framework highlights on organizational factors which are important in influencing performance. It defines this sector as all the factors that are associated with organizational structure, resources, support services and culture to create, maintain and improve RHIS processes as well as its performance. Aqil et al. [8] and Ananta arrived that organizational factors affect RHIS performance through behavioural factors directly or indirectly in 2009 and 2017, respectively. Information Systems boost evidence-based decision making, manage knowledge and produces liquidity and good governance without altering the organizational pecking order [9]. In 1992, Lippeveld et al. [10] put forward that information systems needed to follow communication channels of organizational hierarchy that were already instituted. Emphasis is laid on weighing organizational process of both human and technological exchanges that causes quality products and services in socio-technical systems [11]. Also, Berwick [12] stated that every system is modelled to get the results it achieves. This shows that performance is a characteristic of a system. Therefore, the PRISM framework highlights that every component of a system; health system and its actors as well as leaders and workers inclusive are responsible for improving the performance of RHIS.

Shared values help in controlling organizational processes far better than formal structures [13]. In view of this, we can state that people are more concerned on sharing what is relevant and valued in an organization than doing what they are told to do. Shared principles associated with information systems are cited to as an antecedent culture of data collection [3] or "Culture of Information" [14, 15] without pinpointing how these values came about and sustain themselves as well. Data collector's perception is a copy of the abjured submission in the health system. Most data collectors rarely appreciate the importance of data in decision making since they perceive their duties to be a normal procedure. We comprehend how values are gotten, managed and susceptible to change through studies in organizational culture [16, 17]. Shein (1991) [18] acknowledges that organizational culture is a frame of solutions to problems that have worked over time. New members are educated that its the right way to discern, reason and perceive in relation to the identified problems. Positive impact of values on attitude of members of an association was illustrated by Berry and Poortinga [19]. Thus, comprehending collective merits associated with RHIS tasks in health establishments can create chances for stimulating values that are productive to RHIS tasks and further enhance performance.

The effectiveness of organizational culture in enhancing performance is well instituted [20–22]. Akin to this, this current study states that nurturing a culture of information will go a long way in enhancing RHIS performance. Nevertheless, the use of the term "culture of information" [14, 15] doesn't stipulate any operational definition or any measurement per se for a culture of information. The PRISM framework suggests an operational definition as said by [21] as the capacity and control to improve values and beliefs among the members of an institution by collating, analysing, and using the collected information to achieve the goals and missions of the institution.

To assess the culture of information, principles related to organizational processes that underscore data quality, use of RHIS information, evidence-based decision-making, problem solving, feedback from health staff and community, a sense of responsibility, and empowerment and accountability are chosen, based on the proximity principle [23, 24]. Demonstrating the existence of gaps in promoting a culture of information can be used to motivate senior management in health to renew their commitment to develop strategies for promoting an information culture and strengthening its linkage with RHIS performance [2].

RHIS management [5, 25] is crucial for RHIS performance. It is measured through availability of the RHIS vision statement and the establishment and maintenance of RHIS support services such as planning, training, supervision, human resources, logistics, and finance. By identifying levels of support services, it is possible to develop priorities for actions. This research determines the effect of quality improvement intervention in improving culture of information among health staff in Ghana, particularly in the Ejisu Juaben Health Service over time.

Unlike other research on health information system in general and organizational behaviour in particular [2, 20–22, 26] this study assessed the existing situation with respect to routine health information, designed training modules, trained and worked with front-line health providers, administrators, leaders within Municipal Health structures in quality and use of information for decision making to improve health service delivery [24]. Another uniqueness of this study is seen with the application of Quality Improvement (QI) methods to improve performance of RHIS. Quality Improvement is defined in this study as "efficient use of available RHIS resources through effective and reliable processes to produce continuous improvement in the quality and use of information necessary to improve health system performance".

2. Research Method

This section presents the methods and procedures used in the study. The section details profile of the study design, study area, study population, sample size, sample technique, data collection techniques, and tools. It also presents measurements and data analysis, ethical considerations, assumptions of the study as well as reliability and validity of data collection process.

2.1. Study Design. This was a quasi-non-experimental study involving staff in all health facilities in the study area, pre- and post-intervention test were administered to 141 (57%) of the 247 staff to assess the effectiveness of quality improvement training undertaken over a 2-year period.

2.2. Baseline Assessment, Intervention and Endline Assessment. The baseline assessment, intervention and endline assessment, previously described in detail, [24] was implemented from March 2012 to March 2014. A cross sectional study was conducted to provide baseline information to inform the intervention strategy. Based on the gaps identified in the baseline study, four training modules were designed in September 2012. As part of intervention, Data Quality Improvement Team (DQIT) made up of at least two members were selected from each of the health facilities within the Municipal Health Directorate. The DQIT were trained as change agents using the project designed training module to build their capacity to enhance their knowledge and skills identified as gaps in the baseline assessment [24]. Endline assessment was conducted to assess the impact of the intervention between January and March 2014.

2.3. Profile of Study Area. The study was carried out in the Ejisu Juaben Municipality in the Ashanti Region. Ejisu Juaben Municipal is one of the 27 districts and municipals in Ashanti Region. It is located in the South-Eastern part of the Region and shares boundaries with Kwabre, Afigya-Sekyere, Sekyere East and West to the North, Asante Akim North and South Municipal to the East, Bosomtwe District to the South and Kumasi Metropolis to the West. The municipal has a projected population of 146,762 based on the 2010 population and housing census with growth rate of 3.4% per annum (Population and Housing Census, Ghana Statistical Service, 2010). There are 91 communities. The road network is fairly good with few tarred roads. The rest are mainly feeder roads, some of which are not motorable especially during the rainy season. Some of the communities are extremely hard to reach during the rainy season. The only means by which these communities could be reached is by boat, swimming and walking. For the purpose of Health Administration, the municipal has been divided into five sub-municipals namely: Achiase, Bomfa, Ejisu, Juaben, and Kwaso. All the communities within the municipal have Community-Based Surveillance Volunteers (CBSVs). The total number of CBSVs is 200. The total staff strength is 247. There are Twenty-Six health facilities with eighty-one outreach points [24].

2.4. Study Population. The study population comprised health staff and management who collect or use data routinely in all health facilities: both private and public, in the Ejisu-Juaben Municipality. The staff were mainly females, 65% and males 35%. Majority, 70%, had worked in Ghana Health Service for an average of 4.8 years. All facilities staff in the study area who had worked for at least 6 months, involved in data generation, processing and use, and consented to participate were included. Eligible participants who did not meet the inclusion criteria were excluded. Total number of 151 out of 247 health staffs were recruited into the study. However, only 141 consented to participate. Thus, all analysis and conclusions are based on the 141 and not 151 [24].

2.5. Data Collection Techniques and Tools. Data were obtained from health facilities in Ejisu-Juaben Municipality. The study adapted the RHIS performance diagnostic tool component of the Performance of Routine Information System Management (PRISM) tool package, version 3.1. [2, 27, 28], Uganda [29, 30] and further refined in China [31, 32].

2.6. RHIS Performance Diagnostic Tool. This tool was used to determine the overall level of RHIS performance, looking separately at quality of data and use of information. The tool specifically measured: (a) RHIS performance, (b) status of RHIS processes, (c) the promotion of a culture of information, (d) supervision quality, and (e) technical determinants. The tool collected data based on records observation, which is considered the gold standard and therefore confirms its validity. The tool provided opportunities to compare RHIS performance with status of RHIS processes and other determinants, as well as to identify strengths and gaps for appropriate actions/interventions in the municipality [2].

2.7. Measurements and Data Analysis. In assessing whether health facilities in Ejisu-Juaben Municipal Health Service promote a culture of information, the construct was operationalized as having six dimensions - the promotion of:

(1) Use of RHIS information. (2) Evidence-based decision-making. (3) Feedback. (4) Problem solving and (5) sense of responsibility—i.e., efforts and activities to change things for the better, and (6) accountability/empowerment. Each dimension was measured by two to eight items describing behaviours that are thought to directly or indirectly promote a culture of information.

Promotion of evidence-based decision-making was measured by seven items describing behaviours such as: personal liking, superior's directives, evidence/facts, political interferences, comparing strategic objectives, community health needs and considering cost. The promotion of use of RHIS information was measured by three items describing behaviours such as: staff rewarded for good work, use of RHIS for day to day management of the facility and facilities directed by management to display data for monitoring their set targets. Promotion of feedback which was measured by three items describing behaviours such as: whether the health facilities seek feedback from concerned persons, discuss conflicts openly to resolve them and seeking feedback from concerned communities served by the facilities. In the case of promotion of problem solving, the study measured it by four items describing behaviours such as whether: respondents can gather data to find the root cause (s) of problem, staff can develop appropriate criteria for selecting intervention for a given problem, staff can evaluate if the target/outcomes have been achieved.

On the other hand, promotion of sense of responsibility was measured by four items describing behaviours such as: staff being punctual at work, staff documenting their activities and keeping up-to-date records and staff feeling committed to improving the health status of the targeted population.

Promotion of staff accountability/empowerment was measured by five items describing behaviours such as whether: staff are empowered to make decisions, staff are able to say no to superiors and colleagues for demand or decisions not supported by evidence, staff are made accountable for poor performance, staff feel guilty for not accomplishing the set target performance and staff admit mistakes for corrective actions.

The test-retest reliability of the scale scores on culture of information was assessed by conducting *t*-tests on the equality of the means from the baseline and endline surveys. Typically, test-retest reliability is conducted by comparing the scores of each scale among a matched sample of individuals over a short time interval. However, our data were gathered 12 months apart and consisted of individuals who may or may not be the same, but could not be matched.

2.8. Ethical Considerations. The study protocol was submitted to the Committee for Human Research Publications and Ethics (CHRPE) of the Kwame Nkrumah University of Science and Technology for clearance. Permission was also sought from the Municipal Health Directorate to implement the study. The research team was introduced to all the municipal and sub-municipal health facilities by the Municipal Director of Health. The selected facilities were briefed about the study's objectives, potential risks, benefits, the role of the facilities and their freedom to participate and withdraw at any stage of the study. Information leaflets were distributed to potential participants to read and ask questions or make comments. Facilities that agreed to participate were asked to sign an informed consent form to confirm their willingness to be part of the study. The contact address of the Research Team was given to participating facilities for future contacts if they so wished.

2.9. Reliability and Validity. Questionnaires for the study were pre-tested at Mampong in the Sekyere West Municipality, which is not part of the study area but has common characteristics with the Ejisu-Juaben Municipality. Based on feedback from the field pre-test, the tools were modified to ensure its suitability for the study as indicated in our previous article [24].

3. Results

Out of the 141 respondents, Females were twice as that of the males in both the baseline and endline assessments. More than three fourth of the respondents had Post Senior High level of education. The remaining had Senior High School level of education or lower. The mean age of the respondents was 29 years in baseline (range: 21–63 years), while that of the endline was 29.6 years (range: 21–64 years). Mean working experience of respondents in baseline was 4.8 years (range: 1 –36 years) whereas that of the endline was 5 years (range 1–37 years). The specialization of respondents was similar in both baseline and endline which included: Doctors (5%), Physician Assistants (7%), Nurses/Midwives (45%), Technical Officers (34%), Health Information Officers/ Biostatisticians (7%), and other staff (1%). The results of the background characteristics are homogeneous in sample characteristics in both baseline and endline surveys. About 30 percent in baseline compared to 70 percent in endline respectively claimed they had received some training in RHIS in the past six months prior to the time of the survey.

Table 1: Promotion of evidence-based decision-making.

Indicator	Responses				
	Baseline (2012)			Endline (2014)	
	No (%)	Yes (%)	Missing value (%)[1]	No (%)	Yes (%)
Personal liking	100 (70.9)	40 (28.4)	1 (0.7)	106 (75.0)	35 (25.0)
Superior's directives	47 (33.3)	92 (65.2)	2 (1.4)	102 (72.0)	39 (28.0)
Evidence/ facts	37 (26.2)	102 (72.3)	2 (1.4)	10 (8.0)	131 (92.0)
Political interference	105 (74.5)	31 (22.0)	5 (3.5)	125 (89.0)	16 (11.0)
Comparing strategic objectives	22 (15.6)	115 (81.6)	4 (2.8)	22 (16.0)	119 (84.0)
Community health needs	14 (9.9)	121 (85.8)	6 (4.3)	14 (10.0)	127 (90.0)
Considering cost	48 (34.0)	87 (61.7)	6 (4.3)	39 (28.0)	102 (72.0)
Overall	53 (37.6)	84 (59.6)	4 (2.8)	60 (43.0)	81 (57.0)

Source: 2012 and 2014 Survey. [1]The baseline results are characterised with data incompleteness as some respondents did not answer all the required responses. The affected questionnaires were self-administered by the respondents at their own convenient due to their busy schedule at the time of visit. This might account for the gaps. The data completeness gaps are denoted as "missing data values" Tables 1–7.

Table 1 shows respondents' perceived culture of promotion of evidence-based decision-making. In baseline, 59.6 percent of respondents perceived overall promotion of evidence-based decision in the municipal health directorate compared to 57 percent in endline. This change could be partly attributed to the intervention implemented. The results further indicated that decision-makings based on individuals personal liking, superior's directives and political interference reduced from 28.4, 65.2, and 22 to 25, 28, and 11 respectively Table 1.

Table 2 depicts respondents' perceived culture of promotion of use of RHIS information. The overall perceived promotion of the use of RHIS information improved from 73 percent in baseline to 85 percent in endline, showing significant improvement of 12 percent Table 2.

There has been marginal improvement of 3.7 percent in recognition and reward from superiors to their subordinates for the good work done. The intervention influenced 25.1 percent additional staff to use RHIS data for day to day management of the facility. To promoting the of use of RHIS, health facilities in the municipality were directed by their superiors to display data for monitoring their set targets. This resulted in an improvement of 15 percent in the endline compared to the baseline Table 2.

Table 2: Promotion of use of RHIS information.

Indicator	Responses				
	Baseline (2012)			Endline (2014)	
	No (%)	Yes (%)	Missing value (%)	No (%)	Yes (%)
Are rewarded for good work	51 (36.2)	85 (60.3)	5 (3.5)	51 (36.0)	90 (64.0)
Use RHIS data for day to day management of the facility	33 (23.4)	100 (70.9)	8 (5.7)	5 (4.0)	136 (96.0)
Facilities are directed to display data for monitoring their set targets	26 (18.4)	114 (80.9)	1 (0.7)	5 (4.0)	136 (96.0)
Overall	37 (26.2)	100 (70.9)	4 (2.8)	20 (15.0)	121 (85.0)

Source: 2012 and 2014 survey.

Table 3: Promotion of feedback.

Indicator	Responses				
	Baseline (2012)			Endline (2014)	
	No (%)	Yes (%)	Missing value (%)	No (%)	Yes (%)
Seek feedback from concerned persons	18 (12.8)	122 (86.5)	1 (0.7)	10 (7.0)	131 (93.0)
Discuss conflicts openly to resolve them	58 (14.1)	82 (58.2)	1 (0.7)	25 (18.0)	116 (82.0)
Seek feedback from concerned community	43 (30.5)	96 (68.1)	2 (1.4)	40 (28.0)	101 (72.0)
Overall	40 (28.4)	100 (70.9)	1 (0.7)	25 (18.0)	116 (82.0)

Source: 2012 and 2014 survey.

Table 3 represents respondents' perceived culture of promotion of feedback. The overall assumed promotion of feedback within the municipal health directorate recorded improvement from 70.9 percent in baseline to 82 percent in endline, indicating 11 percent increase over the period (Table 3). In the health departments, superiors sought feedback from concerned persons and thus recorded an improvement above 6 percent.

To promote openness and feedback in the workplace, superiors discussed conflicts openly to resolve them. There was impressive improvement, exceeding 23 percent, in an open discussion and resolution of conflicts in a bid to promotion of feedback within the municipal health directorate.

Table 4 indicates respondents' perceived culture of promotion of problem solving. There was a significant improvement nine percent in the overall promotion of problem solving. Besides, there was impressive improvement of 11 percent in staff response with regards to their ability to gather data to find the root cause(s) of the problem as well as their capability to develop appropriate criteria for selecting intervention for a given problem (Table 4).

Again, respondents perceived ability to develop appropriate outcomes of a particular intervention improved by in the region of nine percent whereas their ability to evaluate whether the targets/outcomes had been achieved increased by approximately seven percent (Table 4).

Table 5 indicates respondents' perceived culture of promotion of a sense of responsibility. Considering the overall promotion of sense of responsibility, post interventional results indicated 11 percent improvement in promotion of sense of responsibility behaviour, 87 percent in baseline and 98 percent in endline.

The endline assessment suggested perceived improvement of seven percent regarding staff punctuality in undertaking RHIS related tasks coupled with improvement in documentation of activities and records keeping. Staff feel committed to improving health status of the targeted population as indicated by improvement of nearly 20 percent from baseline to endline Table 5.

Table 6 shows respondents' perceived culture of promotion of accountability/empowerment. Promotion of staff accountability/empowerment recorded improvement from 58 percent in baseline to 74 percent in endline, indicating 16 percent increase over the period (Table 6). Post interventional results indicated an improvement of over 19 percent perceived empowerment of staff to make decisions.

The results further revealed an improvement of approximately 10 percent of staff perceived to have been able to say no to superiors and colleagues for demand/decisions not supported by evidence. There has been improvement in accountability, staff are made accountable for poor performance as was attested by 79 percent of respondents compared to 55 percent in the postintervention and preintervention respectively.

Table 7 shows respondents' perceived culture of promotion of overall culture of information. The results indicate that 71 percent and 81 percent of respondents perceived that the Municipal Health Service promotes culture of information in baseline and endline respectively; showing overall average improvement of 10 percent Table 7.

Test-retest analysis suggested that the mean levels of the indices measuring promotion of a perceived culture of information, was significantly higher in endline compared to the situation in baseline (mean1 = 0.70, SD1 = 0.11, n1 = 141; mean2 = 0.80, SD2 = 0.13, n2 = 141; Std. Err of Diff = .014862; $p < 0.005$). The study concludes that these data provide statistically significant evidence that there is a change in the overall culture of information among staff in the Ejisu Juaben Health Service over time.

4. Discussions

The gender composition of the baseline and endline are similar indicating that more females are engaged in RHIS tasks in the municipality. The result indicates homogeneity in the

Table 4: Promotion of problem-solving.

Indicator	Responses				
	Baseline (2012)			Endline (2014)	
	No (%)	Yes (%)	Missing value (%)	No (%)	Yes (%)
Can gather data to find the root cause(s) of the problem	25 (17.7)	115 (81.6)	1 (0.7)	10 (7.0)	131 (93.0)
Can develop appropriate criteria for selecting intervention for a given problem	32 (22.7)	106 (75.2)	3 (2.1)	20 (14.0)	121 (86.0)
Can develop appropriate outcomes of a particular intervention	32 (22.7)	109 (77.3)	0 (0)	20 (14.0)	121 (86.0)
Can evaluate whether the targets/outcomes have been achieved	32 (22.7)	109 (77.3)	0 (0)	22 (16.0)	119 (84.0)
Overall	30 (21.3)	110 (78.0)	1 (0.7)	18 (13.0)	123 (87.0)

Source: 2012 and 2014 survey.

Table 5: Promotion of a sense of responsibility.

Indicator	Responses				
	Baseline (2012)			Endline (2014)	
	No (%)	Yes (%)	Missing value (%)	No (%)	Yes (%)
Are punctual	13 (9.2)	125 (88.7)	3 (2.1)	5 (4)	136 (96)
Document their activities and keep records	7 (5.0)	134 (95.0)	0 (0)	0 (0)	141 (100)
Feel committed to improving health status of the targeted population	26 (18.4)	109 (77.3)	6 (4.3)	6 (3)	135 (97)
Overall	15 (10.6)	123 (87.2)	3 (2.1)	4 (2)	137 (98)

Source: 2012 and 2014 Survey.

Table 6: Promotion of accountability/empowerment.

Indicator	Responses				
	Baseline (2012)			Endline (2014)	
	No (%)	Yes (%)	Missing value (%)	No (%)	Yes (%)
Are empowered to make decisions	50 (35.5)	88 (62.4)	3 (2.1)	25 (18)	116 (82)
Able to say no to superiors and colleagues for demand/decisions not supported by evidence	68 (48.2)	67 (47.5)	6 (4.3)	60 (43)	81 (57)
Are made accountable for poor performance	38 (27.0)	77 (54.6)	26 (18.4)	30 (21)	111 (79)
Feel guilty for not accomplishing the set/target performance	46 (32.6)	85 (60.3)	10 (7.1)	46 (33)	95 (67)
Admit mistakes for taking corrective actions	30 (21.3)	92 (65.2)	19 (13.5)	20 (14)	121 (86)
Overall	46 (32.6)	82 (58.2)	13 (9.2)	36 (26)	105 (74)

Source: 2012 and 2014 Survey.

background characteristics of respondents in both baseline and endline. Pearson's analysis indicates no statistical significance (p-value > 0.005) of association between the background characteristics of respondents and their competencies in performing RHIS tasks [24].

Organizational culture defines the way of employees' complete tasks and interacts with each other within the organization. The cultural pattern comprises various beliefs, values, rituals and symbols that govern the operating style of the people within a company. Organization culture binds the employees together and provides a direction for the growth of company. Organizational cultures can have varying impacts on employee performance and motivation levels. Oftentimes, employees work harder to achieve organizational goals if they consider themselves to be part of the organizational culture [26].

There was marginal improvement (−2.6%) of overall perceived promotion of evidence-base decision-making. The results show an indication of reduction in decision-making based on individual personal liking, superior's directive and political interference. This is an indication of an improved governance, which includes decision-making at all levels of the health system—where information has been identified as key, interacting levers of health system strengthening [33]. This is in agreement with Bernstein et al. who opines that Data and information are fundamental to every function of public health and crucial to public health agencies, from outbreak investigations to environmental surveillance. Information allows for timely, relevant, and high-quality decision making by public health agencies. Promotion of evidence-based decision-making is an important, grounding principle within public health practice [8]. This helps to promote decentralization, to improve workforce performance, needs to devolve power further down from district authorities onto district health managers. District Health Management Teams (DHMTs) need not only more power and authority to make decisions about their workforce but also more control over resources to be able to implement these decisions [34].

Table 7: Overall perceived culture of information.

Composite indicator	Responses				
	Baseline (2012)			Endline (2014)	
	No (%)	Yes (%)	Missing value (%)	No (%)	Yes (%)
Promotion of evidence-based decision-making	53 (37.6)	84 (59.6)	4 (2.8)	60 (43)	81 (57)
Promotion of use of RHIS information	37 (26.2)	100 (70.9)	4 (2.8)	20 (15)	121 (85)
Promotion of feedback	40 (28.4)	100 (70.9)	1 (0.7)	25 (18)	116 (82)
Promotion of problem-solving	30 (21.3)	110 (78.0)	1 (0.7)	18 (13)	123 (87)
Promotion of a sense of responsibility	15 (10.6)	123 (87.2)	3 (2.1)	4 (2)	137 (98)
Promotion of accountability/empowerment	46 (32.6)	82 (58.2)	13 (9.2)	36 (26)	105 (74)
Overall (Average)	37 (26.2)	100 (70.9)	4 (2.8)	27 (19)	114 (81)

Source: 2012 and 2014 Survey.

To promote the use of information, Health managers directed the facilities to display data for monitoring their set targets. This resulted in significant improvement (15%) of the overall perceived promotion of use of RHIS information, improved from baseline to endline of the study. Interactive data visualization is an evolving approach that supports planning and decision making in multidimensional decision making and planning processes. Data visualization contributes to the formation of mental image data and this process is further boosted by allowing interaction with the data [35]. This points to the views of Benning which encourage healthcare managers to using the results obtained from their health data when considering implementing customizing health care programs, because it may help to find ways to save costs and increase patient satisfaction. Health Management Information Systems produce large amounts of data about health service provision and population health, and provide opportunities for data-based decision-making in decentralized health systems. Nonetheless, data are underutilized locally to support planning and decision-making [36].

Feedback is an important process for identifying problems for resolution, for regulating and improving performance at individual and system levels, and for identifying opportunities for learning [37, 38]. The overall assumed promotion of feedback improved by 11% over the persssiod, thus, contradicting previous studies which established feedback to have remained a weak process of RHIS in many developing countries [3, 27, 28, 30, 39]. The impressive performance could be attributed to the study design which sought to encourage supervisors to discuss routine health information performance whenever he/she visited the facility. Regular feedback to frontline staff enhances culture of information [24].

The improvement (9%) of the overall promotion of problem solving, could be attributed to respondents improved competency in problem solving after intervention. Perhaps, improvement in staff understanding of RHIS performance indicators after the intervention might have contributed to this. Nevertheless, there was impressive improvement of 11 percent in staff response with regards to their ability to gather data to find the root cause(s) of the problem as well as their capability to develop appropriate criteria for selecting intervention for a given problem. Respondents perceived ability to develop appropriate outcomes of a particular intervention and their ability to evaluate whether the targets/outcomes deteriorated. The improvement in performance could be attributed to the high competencies exhibited by respondents due to the intervention [24].

Organizational culture shows a clear sense of purpose and commitment towards organization mission which enhances employee's performance towards goal attainment [26]. Similar observation was made in this study, given that the overall promotion of sense of responsibility, post interventional results indicate 11 percent improvement in promotion of sense of responsibility behaviour, on the other hand, promotion of staff accountability/empowerment recorded improved by 16 percent increase over the period. This is in accordance with a study which found that organizational culture provides employees with a sense of guidance, direction and expectations that keep employees on task and makes them understand their role and responsibilities. Organizational culture creates a positive impact on employee's attitude & behaviour and in turn employees accomplish task prior to established deadlines [26].

There has been evidence of improvement in the RHIS performance and processes in the Ejisu Juaben Municipal Health Service [24, 40], as previous studies had established relationship between the efficacy of organizational culture and improved RHIS performance [2, 20–22, 26] This implies planning and management decision-making that rely on RHIS at operational and management level will be better and more reliable than ever before which will lead to improvement in health service delivery to the population.

4.1. Limitations of the Study. While this design allows the study to document changes in outcome indicators in target beneficiary of the intervention, it is difficult to know to what extent these changes are actually due to this study. Extraneous factors could have either a positive or negative effect on study's intended outcomes, thus hiding the programs true effect. Requires supplicated analysis to strengthening findings. The simple random sample used is only practicable when the population is relatively small and concentrated in a small geographical area and where the sampling frame is complete. To improve utility of the PRISM diagnostic tool, it should be adapted to meet the needs of the RHIS in a given country to reflect their particular objectives and data processes. Before implementing the adapted questionnaires, pre-testing is needed to fine tune it to make it more suitable. The missing data values in the baseline might affect the results, as affected questionnaires were not excluded from the analysis

5. Conclusions

The organizational determinants of RHIS identified were promotion of the use of RHIS, promotion of evidence-based decision-making, promotion of feedback from staff and community, promotion of problem-solving, promotion of a sense of responsibility and promotion of accountability/empowerment. There was improvement in problem solving skills as participant gathered data to find the root cause(s) of problem as well as developing appropriate criteria for selecting intervention for a given problem. Besides, there was improvement in respondent's ability to develop appropriate outcomes of a particular intervention and evaluated whether the targets/outcomes were achieved. The overall assumed promotion of feedback also improved over the period of consideration. Again, sense of responsibility behaviour and staff accountability/empowerment improved over the period. The proportion of respondents perceived culture of information improved significantly overtime and this might have been contributed by the application and adoption of quality improvement training. The study concludes that there is evidence that there is a change in culture of information among staff in the Ejisu Juaben Health Service over time.

Data Availability

The baseline and endline survey data used to support the findings of this study have not been made available because of assurance given to participatory facilities and staff that the raw data would not be shared outside this study.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication this paper.

Authors' Contributions

ROB contributed to the concept, design, data collection, analysis of the research and manuscript writeup. GA and PAB contributed to the manuscript review.

Funding

This study was funded by Richard Okyere Boadu as part of his PhD programme.

Acknowledgments

The Authors are grateful to study participants and the Ejisu Juaben Municipal Health Team for their contributions to the successful completion of the study. We appreciate the support of the staff of School of Public Health, Kwame Nkrumah University of Science and Technology.

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