Implementing health care reform: implications for performance of public hospitals in central Ethiopia

Tsegahun Manyazewal1,2, Mokgadi C Matlakala1

1 Department of Health Studies, College of Human Sciences, University of South Africa, Pretoria, South Africa
2 University of California San Diego, Anti-Viral Research Center, ADDIS VP Project, Addis Ababa, Ethiopia

Background Understanding the way health care reforms have succeeded or failed thus far would help policy makers cater continued reform efforts in the future and provides insight into possible levels of improvement in the health care system. This work aims to assess and describe the implications of health care reform on the performance of public hospitals in central Ethiopia.

Methods A facility-based, cross-sectional study was carried out in five public hospitals with different operational characteristics that have been implementing health care reform in central Ethiopia. The reform documents were reviewed to assess the nature and targets of the reform for interpretive analysis. Adopting dimensions of health system performance as the theoretical framework, a self-administered questionnaire was developed. Consenting health care professionals who have been involved in the reform from inception to implementation filled the questionnaire. Cronbach's alpha was measured to ensure internal consistency of the instrument. Descriptive statistics, weighted median score, $\chi^2$, and Mann-Whitney U and Kruskal-Wallis tests were used for data analysis.

Results Despite implementation of the reform, the health care system in public hospitals was still fragmented as confirmed by 50% of respondents. Limited effects were reported in favour of quality (48%), access (50%), efficiency (51%), sustainability (53%), and equity (61%) of care, while poor effects were reported in patient-provider (41%) and provider-management (32%) interactions. Though there was substantial gain in infrastructure and workspace, stewardship of health care resources was less benefited. The predominant hindrances of the reform were the working environment (adjusted Odds Ratio ($aOR$) = 2.27, 95% confidence interval (CI): 1.15-4.47), financial resources ($aOR$ = 3.54, 95%CI = 1.97-6.33), management ($aOR$ = 2.27, 95% CI = 1.15-4.47), and information technology system ($aOR$ = 3.15, 95% CI = 1.57-6.32).

Conclusions The Ethiopian health care reform has laid the groundwork for health system improvement, but progress was slow and the health care delivery system was still fragile. Healthcare reform efforts in such settings are feasible, but with regular mapping of programmatic outcomes and bringing a common understanding of the reform among stakeholders.
In the wave of the pressure combating health care challenges and visioning quality of care, the Ethiopian government urged a countrywide health care reform initiative in the form of Business Process Reengineering (BPR). Tracking clients’ allegations about quality of health care, the initiative imposed the Ethiopian Federal Ministry of Health (FMoH) transform the country’s health care system [1]. Rooted on BPR principles [2], the FMoH conducted “as is” analysis to capture credible evidences of the existing health care system and realize the different dynamics that should be considered in the redesign of the new reform. With these, the “to be” business processes were designed, public health sector standards formulated, and standard operating procedures and implementation tools developed [3]. The reform was progressively implemented through a series of training sessions for managers and technicians at all levels followed by changes in staff deployment, specific job assignments and the recruitment of new staff. Stretched objectives were synthesized and sub-processes that form the core process sorted out. Public hospitals’ services were re-structured into three major case teams, namely; Emergency, Outpatient, and Inpatient; where Outpatient and Inpatient case teams were further classified into eight and nine case teams, respectively [4]. Gradually, Ethiopia implemented the BPR in all government sectors to solve the problems of hierarchical bureaucracy.

Beyond the health care reform in Ethiopia, there have been debates on implications of health care reform in resource-limited countries. In Uganda, while official reports developed by donor funded expatriate staff have tended to show a positive picture of the Ugandan health sector reform [5], other studies indicate that despite these reforms, the Ugandan health sector remains challenged by under-funding [6] and poor quality of care [7]. Kenya has been in the process of implementing health care reforms to secure a fundamental change in the functioning and performance of its health care services. Despite these efforts, the health system in Kenya is inequitable and the health financing is fragmented, requiring a systematic approach to health financing reforms to ensure health coverage and equity [8] and to reinforce Health Sector Costing Model to reach the target of the country’s Vision 2030 [9]. In Tanzanian, the government’s Decentralization by Devolution health reform deemed to improve the delivery of public health services has gained successes and faced challenges [10]. The approach benefited from the increased accountability of health workers and reduced bureaucratic procedures in decision-making, however, it was challenged by funding constraints, unnecessary political interference, lack of sufficient and technically qualified personnel, and weak supportive supervision activities [10]. In South Africa and Zimbabwe, the attempts for health care reform end with ambiguity; as key aspects of the proposed National Health Insurance (NHI) scheme remains unclear and mandatory national health insurance has been discussed for decades without a system implemented in the two countries respectively [11]. In South Africa, funding was not the central problem of the public health system; but rather the enormous inefficiencies in management and low productivity, with an urgent need to re-engineer the way health facilities are internally organized to achieve better productivity and responsiveness [12].

Similar to countries in Africa, many countries’ governments in other regions have been implementing health care reforms to review their health care systems and health care services financing and delivering approaches. China has recently been compelled to undertake health sector reforms in response to inequitably distributed health services, but tackling high medical costs has not been fruitful [13,14] and sustaining positive gains has been difficult [15]. Healthcare reform in China may succeed if vertical monitoring of the quality, equity, efficiency and effectiveness of the health sector is improved [16,17]. Brazil and Colombia have implemented extensive health care reforms for decades with the major goal of improving access, increasing efficiency and reducing health inequities, but in neither case have reforms seemed to have had a decisive positive impact on the health outcomes, instead, the countries’ health improvement decelerates in the years following the reforms [18]. During the financial crisis in European countries, health care facilities have become a focal point for health care reform strategies, which consist of reducing cost as a short-term strategy and improving performance in the long run, but the reforms emphasize cost containment measures rather than embarking on structural redesign of the health care sector [19].

Analysis of literatures reviewed reveals that health care reform efforts in Africa have limited implications on the overall health system improvements, which was mainly due to minimum commitments the countries had exerted in the implementation of the reforms. The effects of the reforms were shown to be highly influenced by political principles and the unique health concerns of each country.

Healthcare institutions intend to use different business models such as total quality management, continuous quality improvement, just-in-time, BPR, benchmarking and among others to re-design their processes [20]. BPR, which is the focus of this study, is the fundamental thinking and radical redesign of business processes to achieve improvements in critical, contemporary measures of performance, such as cost, qual-
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inception in 2009. The five hospitals were purposively included as the study sites to maximize the scope of the study thereby ensure external validity.

The study population was all health care providers that were working in the study sites at the time of data collection (n = 1681). Of this, those who were employed at least one year before the inception of the reform (n = 476, 28%) were purposively selected to include respondents who knew the performances of the hospitals before implementation of the reform and who could better analyse the changes that occurred due to the reform. The health care providers included medical doctors, laboratory professionals, nurses, health officers, pharmacists, dentists and sanitarians.

Data collection instrument

The reform documents as well as previous health care reform initiatives in the country were reviewed to assess the nature and targets of the reform for interpretive analysis. In order to develop a quality questionnaire, we reviewed secondary data; assessed related studies conducted previously, determined the target population and their educational levels, and considered the advice of experts before designing the questionnaire. Additionally, an in-depth review of literature was conducted to identify critical factors that could influence the success of BPR programs. Finally, six BPR critical success factors were identified; namely, financial resources, top management commitment and support, training, collaborative working environment, flatter structure, and information technology [31,39-43].

A self-designed structured, close-ended questionnaire with 82-items and close-ended 5-level scale [44] was used to collect data. The layout of the questionnaire was divided in logical order into six contents of the health system performance dimensions indicated above; namely, quality, access, equity, efficiency and sustainability, along with demographics.

In the “quality” component of the questionnaire, 32 items (Cronbach’s alpha = 0.960) were included to analyse the reform’s implication on quality of health care services. The quality investigation was guided by three health care quality dimensions: structure-process-outcome, as proposed in the Donabedian quality-of-care framework [45]. We included 22 items to measure the “outcome” quality (Cronbach’s alpha = 0.958); eight items focusing on patient-provider interaction; four items on documentation, and monitoring and evaluation; and nine items on provider-management interactions constructed from the targets depicted by the Ethiopian government in its reform document [4]. For “process”, we included eight items (Cronbach’s alpha = 0.921) to assess appropriateness of the methods and procedures followed in the implementation of the reform. “Structure” had two items aimed at assessing improvements of the overall structure of the hospitals to meet the daily workflow.

“Access” was examined using 25 items (Cronbach’s alpha = 0.960) in the questionnaire; based on the five dimensions of health care access; namely, physical, economic, temporal, cultural, and approachability dimensions. The “physical” dimension assessed availability of work space, furniture, equipment, supplies, medications, reagents, communication materials, and other supplies in the hospitals after implementation of the reform. The “economic” dimension assessed the overall effect of the reform on financing and financial management system, and “temporal” dimension assessed the effect of the reform on improving turn-around-time of the hospitals’ health care services. “Cultural” dimension assessed acceptability of the hospitals’ services, and “approachability” dimension assessed the effect of the reform on improving awareness of the community that some form of health services exists, can be reached, and have an impact on their health.

The “equity” section included four items in the questionnaire to assess availability of resources and systems in the hospitals that would benefit every citizen. “Efficiency” component used twelve items to assess the technical, economic and allocative processes related to how and which services are produced in the reform process. “Sustainability” of hospitals’ services was assessed using nine relevant items in the questionnaire.

The respondents received and completed the study questionnaire in paper-based form while they were on their working area. Each of the five responses in the questionnaire had a numerical value (1-5), in which the highest two scoring answers (4 and 5) were perceived as positive response answers, the lowest two scoring answers (1 and 2) were considered negative response answers, and the middle response answer (3) was perceived neutral. As the questions’ items were grouped into health care performance dimensions, a scale score was computed as the mean of the scales’ item scores.

The six BPR critical success factors identified in our literature review were used as a guide in identifying and analysing the factors that influence implementation of the BPR health care reform. From the study's ques-
tionnaire, the item stating “the hospital becomes a better treatment facility” was taken as the outcome variable to indicate whether there was hospital service improvement. This item had original responses classified in five level scale. The responses were dichotomized into “Good” or “Poor” answers by taking the “Strongly agree” and “Agree” responses as a “Good” value while “Strongly disagree”, “Disagree”, and “Neutral” as “Poor” value for feasibility of analysis and interpretation. The six BPR critical success factors were taken as the explanatory variables. For each of the six success factors, three items which best describe the factor were pooled from the questionnaire and the responses given to the items analysed as a cumulative effect. Responses were valued as “Good” if at least two of the three items had a “Strongly agree” or “Agree” response in the original scale questionnaire, while the remaining responses were taken as “Poor” value. Associations of health service improvement with the six explanatory variables were tested independently using bivariate analysis. Based on the results, the independent variables were selected for the logistic regression analysis. Subsequently, multivariate logistic regression analysis was conducted to exclude confounders.

Reliability of the data collection instruments was ensured by running Cronbach’s alpha test [46] for each category of items, and the results were found satisfactory. The questionnaire included close-ended questions to ensure a rational reproducibility of the study. The questionnaire was pre-tested at the study sites to ensure reliability of the instrument. Internal validity was increased through reviewing and analysing previous questionnaires and crosschecking the collected data. The inclusion of all five public hospitals that participated in the reform from inception as the study sites maximized the scope of the study to the target population. We emphatically believe that public health care providers, who are the ultimate resources of health systems, were the best candidates to validate the success or failure rate of the BPR health care reform implemented in Ethiopia. We employed the perceptions of health care providers to assess and describe the implications of the health care reform due to multiple reasons. The exclusion of patients was based on the fact that there are unwanted variations in health care practice and outcomes that cannot be explained by patients [47] and health care improvements resulting from patients’ feedback is limited [48], while providers feedback and involvement is critical as providers can realize the overall implications of health care reforms [49-52]. We also believe that the major reform the Ethiopian government designed and implemented to date to enhance the health care service delivery system in the country is the BPR health care reform. In this manner, this reform, which we assessed, is responsible for major public health care services’ gains or losses.

The study was granted ethical clearance from the Higher Degrees Committee of the Department of Health Studies, University of South Africa and the Research and Technology Transfer Core-process of the Addis Ababa City Administration Health Bureau. Written informed consents were obtained from each respondent before completing the questionnaire.

Data analysis was done through calculation of several statistical procedures on IBM SPSS version 20 (IBM Corp, Armonk, NY, USA) and on Excel 2010 (Microsoft Corp, Seattle, WA, USA). The variables were re-coded and dichotomized where appropriate on SPSS. Descriptive statistical analysis [46] was conducted to describe the means, standard deviations, medians and frequencies of items aimed at measuring quality, access, equity, efficiency, and sustainability of health care services. The weighted median scores [53] were used to demark cut-off points and categorize the perceived health service improvements. Non-parametric analysis, namely Mann-Whitney test and Kruskal-Wallis test [54], were conducted to statistically test if there was a significant difference in answering tendencies of respondents with different groups. $\chi^2$ test [46] was used to evaluate association of different variables, and $P<0.05$ at 95% CI was taken as mark for statistical significance. The association between health service improvement and BPR critical success factors were tested independently using bivariate analysis. Variables with significant associations were analysed further with logistic regression analysis [55].

RESULTS

Socio-demographic profiles

Of the total participants who were eligible as they have worked in the hospitals for at least a year before the inception of the reform (n = 476), the questionnaire was distributed to those who consented (n = 465). The questionnaires returned (n = 410, 88%) were rechecked for completeness and those completed (n = 406) presented for analysis. Majority of the respondents were nurses (n = 304, 74.9%) followed by medical doctors (n = 35, 8.6%), and medical laboratory professionals (n = 24, 5.9%). The demographic profiles are represented in detail in Table 1.
Quality was explained by three dimensions. For the outcome, 42% responses indicated that the reform did not meet the perceived patients-provider interaction. The lowest score in patient-provider interaction was for bed appointments, where 341 (84%) of respondents claimed that the perceived time limit of 10 minutes allotted in the reform document for patients getting beds has not been met (Table 2). For documentation, 102 (25.1%) respondents agreed that the reform allowed reporting systems of the hospitals to be easy and time-efficient. Additionally, 130 (32%) respondents agreed that hospital guidelines and protocols are up to date and appropriate. For providers-hospital management interaction, respondents’ feedback showed that the hospital staff were not promoted to a relatively higher position (n = 246, 60.6%) or got recognition of their outstanding performance (n = 255, 62.8%). Besides, the reform did not allow for increases in salaries of staff (n = 256, 63.1%) nor did it create a better feeling of overall job satisfaction among staff (n = 228, 56.2%). The relatively positive input of the reform was on work relationship, in that the reform created better working relationship among staff (n = 204, 50.2).

The overall analysis of findings indicates that provider-management system interaction of the hospitals is still weak. The weighted median descriptive statistics made on outcomes of quality from visual binning of the variables, suggest that 207 (51%) of the respondents agreed that the BPR health care reform has brought improvements on hospital quality outcomes, while 199 (49%) indicated that there are no improvements. For process, among the major gaps in the health care reform implementation process was training, and 246 (60.6%) of the respondents explained that adequate training had not been provided to all staff throughout the BPR implementation process. Additionally, only 68 (16.7%) of respondents agreed that the reform process involved stakeholders on the new design and received their feedback (Table 2).

**Table 1.** Socio-demographic characteristics of respondents

| ITEM | Count (n = 406) | % | Cumulative % |
|------|-----------------|---|--------------|
| Gender: | | | |
| Male | 124 | 30.5 | 30.5 |
| Female | 282 | 69.5 | 100.0 |
| Age (years): | | | |
| 20-29 | 93 | 22.9 | 22.9 |
| 30-39 | 195 | 48.0 | 70.9 |
| 40-49 | 92 | 22.7 | 93.6 |
| 50-59 | 26 | 6.4 | 100.0 |
| Duration of work as health professional (years): | | | |
| 6-9 | 146 | 36.0 | 36.0 |
| 10-19 | 202 | 49.8 | 85.7 |
| 20-29 | 55 | 13.5 | 99.3 |
| 30-39 | 03 | 0.7 | 100.0 |
| Duration of work as staff in this hospital (years): | | | |
| 6-9 | 247 | 60.8 | 60.8 |
| 10-19 | 136 | 33.5 | 94.3 |
| 20-29 | 21 | 5.2 | 99.5 |
| 30-39 | 02 | 0.5 | 100.0 |
| Profession: | | | |
| Medical Doctor | 35 | 8.6 | 8.6 |
| Laboratory | 24 | 5.9 | 14.5 |
| Pharmacy | 16 | 3.9 | 18.5 |
| Nurse | 304 | 74.9 | 93.3 |
| Health Officer | 14 | 3.4 | 96.8 |
| x-ray technician | 11 | 2.7 | 99.5 |
| Sanitarian | 2 | 0.5 | 100.0 |
| Level of education: | | | |
| Certificate | 2 | 0.5 | 0.5 |
| Diploma | 37 | 9.1 | 9.6 |
| Degree | 342 | 84.2 | 93.8 |
| MSc/MA or MPH | 7 | 1.7 | 95.6 |
| Medical Doctor Degree + Specialty | 18 | 4.4 | 100.0 |
| Total | 406 | 100 | 100 |
Table 2. Descriptive analysis of health care quality

| Perceived service quality                                                                 | Agree frequency (%) | Neutral frequency (%) | Disagree frequency (%) |
|------------------------------------------------------------------------------------------|---------------------|-----------------------|------------------------|
| **Outcome**                                                                              |                     |                       |                        |
| Due to the BPR health care reform:                                                        |                     |                       |                        |
| 1.1.1. Out patients are completing treatment services within 2 hours                       | 144 (35.5)          | 42 (10.3)             | 220 (54.2)             |
| 1.1.2. Emergency patients are receiving treatment immediately                              | 232 (57.1)          | 67 (16.5)             | 107 (26.4)             |
| 1.1.3. Patients are getting beds within 10 min                                            | 27 (6.7)             | 38 (9.4)              | 341 (84)               |
| 1.1.4. Patients are receiving specialized services within 72 hours                          | 199 (49)            | 65 (15.5)             | 144 (35.5)             |
| 1.1.5. Customers are receiving medical certificate within 1 hour                            | 237 (58.4)          | 85 (20.9)             | 84 (20.7)              |
| 1.1.6. Patients satisfied with the hospital services                                      | 184 (43.3)          | 114 (28.1)            | 108 (26.6)             |
| 1.1.7. Treatment & respect of patients improved                                            | 213 (52.5)          | 79 (19.5)             | 114 (28.1)             |
| 1.1.8. Missing patients’ medical records is rare                                            | 107 (26.4)          | 66 (16.3)             | 233 (57.4)             |
| **% Patient-provider interaction**                                                         |                     |                       |                        |
| 1.1.9. Reporting systems are easy and not time consuming                                   | 102 (25.1)          | 76 (18.7)             | 228 (56.2)             |
| 1.1.10. Guidelines & protocols are up-to-date & appropriate                                | 130 (32)            | 87 (21.4)             | 197 (48.6)             |
| 1.1.11. Opportunities to learn from successes/challenges created                           | 190 (29.6)          | 96 (23.6)             | 120 (46.8)             |
| 1.1.12. Up-to-date technologies for patient diagnosis are in use                            | 150 (36.9)          | 92 (22.7)             | 164 (40.4)             |
| 1.1.13. Monitoring & evaluation systems are established                                     | 181 (44.6)          | 94 (23.2)             | 131 (32.3)             |
| **% Documentation & progress monitoring**                                                   |                     |                       |                        |
| 1.1.14. Staff developed good working relationship with each other                           | 204 (50.2)          | 82 (20.2)             | 120 (29.6)             |
| 1.1.15. Staff receive appropriate & timely performance feedback                            | 131 (32.3)          | 78 (19.2)             | 197 (48.5)             |
| 1.1.16. Staff have clear job description                                                   | 188 (46.3)          | 96 (23.6)             | 122 (30)               |
| 1.1.17. Staff get a better feeling of overall job satisfaction                              | 111 (27.3)          | 67 (16.5)             | 228 (56.2)             |
| 1.1.18. Staff are highly motivated to their work                                           | 96 (25.7)           | 77 (19)               | 233 (23.6)             |
| 1.1.19. Staff salary increases                                                            | 93 (22.9)           | 57 (14)               | 256 (63.1)             |
| 1.1.20. Staff promoted to a relatively higher position                                     | 92 (22.7)           | 68 (16.7)             | 246 (60.6)             |
| 1.1.21. Staff with outstanding performance are getting recognition                          | 93 (22.9)           | 58 (14.3)             | 255 (62.8)             |
| 1.1.22. Staff use their working hours appropriately                                       | 166 (40.9)          | 59 (14.5)             | 181 (44.6)             |
| **% Staff-hospital management system interaction**                                         | 32%                 | 18%                   | 50%                    |
| **% Outcome**                                                                            | 37%                 | 18%                   | 45%                    |

**Process:**

In the BPR implementation process:

| 1.2.1. Staff are able to clearly know the mission and vision of the hospital          | 218 (53.7)          | 130 (32)             | 58 (14.3)             |
| 1.2.2. Supervisors were coming from health bureau to monitor the reform effort        | 119 (29.3)          | 156 (38.4)           | 131 (32.3)            |
| 1.2.3. Hospital quality improvement goals were known throughout case teams           | 199 (49)            | 109 (26.8)           | 98 (24.1)             |
| 1.2.4. Hospital employees were involved in developing plans                           | 165 (40.6)          | 78 (19.2)            | 163 (40.1)            |
| 1.2.5. Adequate training has been provided to all staff                               | 109 (26.8)          | 51 (12.6)            | 246 (60.6)            |
| 1.2.6. Stakeholders communicated on the new design and feedbacks received             | 68 (16.7)           | 144 (35.5)           | 194 (47.8)            |
| 1.2.7. Feedbacks from patients and data from pilot test were incorporated              | 90 (22.2)           | 114 (28.1)           | 202 (49.8)            |
| 1.2.8. The right team members have been prepared to process the reform                | 117 (28.8)          | 123 (30.3)           | 166 (40.9)            |
| **% Process:**                                                                         | 33%                 | 28%                  | 39%                   |

**Structure:**

Due to implementation of BPR health care reform:

| 1.3.1. The way the hospital is structured is conducive to the daily work flow            | 161 (39.7)          | 110 (27.1)           | 135 (33.3)            |
| 1.3.2. The hospital becomes a better treatment facility                                 | 202 (49.8)          | 136 (33.5)           | 68 (16.7)             |
| **% Structure**                                                                         | 45%                 | 30%                  | 25%                   |

BPR – business process reengineering

Overall, 211 (52%) of respondents indicated that appropriate procedures have not been followed in the processing of the reform. For structure, 52.5% of respondents argued that there is no improvement in the structure of the hospitals, while 322 (65%) of participants agreed that the hospitals became conducive to the daily workflow.

From the analysis of the weighted median score from visual binning of the variables, 211 (52%) of respondents indicated that there are no improvements in quality of health care services due to implementation of the BPR health care reform.

**Access**

Access was explained by five dimensions, with which, 206 (50.7%) of respondents indicated that the reform enabled the hospitals organized with case teams that have well-defined rooms or spaces adequate
to the daily work flow (Table 3). However, according to the respondents, there were other physical barriers which were compromising their day-to-day activities. The respondents claimed that after implementation of the reform, the hospitals still have insufficient office furniture (n = 227, 55.9%), stationery materials (n = 238 58.6%), and reagents and drugs (n = 215 53%). Additionally, the hospitals lack conducive staff rest rooms (n = 266 65.5%) and clean work areas (n = 192 47.3%). Implementation of the reform did not empower the hospitals to get equipped with internet services (n = 332, 81.8%), functioning computers (n = 343 56%) and a functioning landline telephone to call within and outside the hospitals (n = 239 58.9%). Preventive and curative maintenance of diagnostic equipment were also described as ineffective. The overall finding indicated that implementation of the reform did not address the shortages or absence of critical physical dimensions that are needed for the hospitals’ day-to-day services.

Table 3. Descriptive analysis of health care access

| Perceived Access                                                                 | Agree Frequency (%) | Neutral Frequency (%) | Disagree Frequency (%) |
|---------------------------------------------------------------------------------|---------------------|-----------------------|------------------------|
| 2.1. Physical dimension                                                         |                     |                       |                        |
| 2.1.1. Defined room/spaces for each case team                                   | 206 (50.7)          | 94 (23.2)             | 106 (26.1)             |
| 2.1.2. Enough office furniture                                                  | 140 (34.5)          | 39 (9.6)              | 227 (55.9)             |
| 2.1.3. Enough stationery materials                                              | 128 (31.5)          | 40 (9.9)              | 238 (58.6)             |
| 2.1.4. Enough reagents/drugs/supplies to perform daily activities               | 111 (27.3)          | 80 (19.7)             | 215 (53.0)             |
| 2.1.5. Clean work area                                                          | 118 (29.1)          | 96 (23.6)             | 192 (47.3)             |
| 2.1.6. Conducive staff rest room                                               | 67 (16.5)           | 73 (18)               | 266 (65.5)             |
| 2.1.7. Functioning computers as needed                                          | 154 (37.9)          | 62 (15.3)             | 190 (46.8)             |
| 2.1.8. Internet access                                                          | 46 (11.3)           | 28 (6.9)              | 332 (81.8)             |
| 2.1.9. Backup generator whenever needed                                          | 251 (61.8)          | 103 (25.4)            | 52 (12.8)              |
| 2.1.10. A functioning and accessible landline                                   | 98 (24.1)           | 69 (17)               | 239 (58.9)             |
| 2.1.11. Adequate maintenance service when a diagnostic machine fails            | 77 (19)             | 83 (20.9)             | 244 (60.1)             |
| 2.1.12. A scheduled equipment preventive maintenance services                    | 39 (9.6)            | 107 (26.4)            | 260 (64)               |
| % Physical dimension                                                             | 29%                 | 18%                   | 53%                    |
| 2.2 Economic dimension                                                           |                     |                       |                        |
| 2.2.1. Efficient and effective health care financing system has been established | 141 (34.7)          | 184 (45.3)            | 81 (20)                |
| 2.2.2. Financial mobilization is linked with evidence-based plan                 | 123 (30.3)          | 135 (33.3)            | 148 (36.5)             |
| 2.2.3. Hospital income increased                                                | 207 (51)            | 162 (39.9)            | 37 (9.1)               |
| 2.2.4. Budget consumption becomes effective                                       | 142 (35)            | 151 (37.2)            | 113 (27.8)             |
| 2.2.5. Corruption suspects decreased                                            | 144 (35.5)          | 97 (23.9)             | 165 (40.6)             |
| % Economic dimension                                                             | 37%                 | 36%                   | 27%                    |
| 2.3 Temporal dimension                                                           |                     |                       |                        |
| 2.3.1. Patients receive hospital services on time                                | 223 (54.9)          | 81 (20)               | 102 (25.1)             |
| 2.3.2. Patients’ appointment wait-time is reasonable                             | 216 (53.2)          | 81 (20)               | 109 (26.8)             |
| 2.3.3. Patients’ time spent while waiting in reception is reasonable             | 219 (53.9)          | 72 (17.7)             | 115 (28.3)             |
| % Temporal dimension                                                             | 54%                 | 19%                   | 27%                    |
| 2.4. Cultural dimension                                                          |                     |                       |                        |
| 2.4.1. Patients receive hospital services using languages and mode of communication suitable to them | 224 (55.2)          | 110 (27.1)            | 72 (17.7)              |
| 2.4.2. There is no patient discrimination                                          | 338 (83.3)          | 45 (11.1)             | 23 (5.7)               |
| % Cultural dimension                                                             | 69%                 | 19%                   | 0.6%                   |
| 2.5. Approachability dimension                                                   |                     |                       |                        |
| 2.5.1. The hospital establishes a system of advocating its services to the community | 157 (38.7)          | 136 (33.5)            | 113 (27.8)             |
| 2.5.2. The community is aware of the hospital’s services                          | 213 (52.5)          | 131 (32.2)            | 62 (15.3)              |
| 2.5.3. The community understands the value of the hospital on their health       | 204 (50.2)          | 140 (34.5)            | 62 (15.3)              |
| % Approachability dimension                                                      | 47%                 | 33%                   | 20%                    |

BPR – business process reengineering
For the economic dimension, 141 (34.7%) of respondents agreed that efficient and effective health care financing systems are in place after implementation of the reform. However, 165 (40.6%) respondents claimed that corruption in the hospitals still exists. In general, 37% responses agreed that there were improvements in economic dimensions of the hospitals, 27% disagreed and 36% were neutral. The overall result of temporal dimension of access showed reasonable improvement, with 54% level of agreement. In the cultural dimension, 224 (55.2%) of the respondents agreed that the reform enabled patients to receive health care services using a mode of communications suitable to them. Additionally, the majority of respondents (n = 338, 83.3%) agreed that there was no patient discrimination in the hospitals since the reform was implemented. The overall analysis revealed that the reform was reasonably capable of addressing the cultural dimensions of health care performance, with only 95 (0.6%) level of disagreement. Conversely, for the approachability dimension, responses indicated that the reform did not effectively address the approachability dimensions of health care reform performance.

According to analysis of the total weighted median score of the five dimensions of health care access, 50% of the respondents revealed that implementation of the BPR health care did not bring improvements on health care access.

**Equity**

Responses on equity indicated that the hospitals are giving medical services with reasonable prices. The findings confirmed that the hospitals gave free services for patients who cannot afford. A total of 284 (70%) of responses indicated that patients with different socio-economic, demographic, ethnic, and/or gender groups have equal access to the hospitals' services (Table 4). Overall, 61% of respondents agreed that health care equity has improved due to implementation of BPR health care reform, while 39% disagree.

| Table 4. Descriptive analysis of health care equity, efficiency, and sustainability |
|---------------------------------|-----------------|-----------------|-----------------|
| 3. Perceived equity             | Agree frequency (%) | Neutral frequency (%) | Disagree frequency (%) |
| After implementation of BPR health care reform: | | | |
| 3.1.1. Amount of money patients pay for getting hospital services is reasonable | 281 (69.2) | 98 (24.1) | 27 (6.7) |
| 3.1.2. The hospital gives free services for patients who cannot afford | 343 (84.5) | 35 (8.6) | 28 (6.9) |
| 3.1.3. The hospital has appropriate infrastructure setup for disabled patients | 115 (28.3) | 43 (10.6) | 248 (61.1) |
| 3.1.4. Patients with different socio-economic, demographic, ethnic, and/or gender groups have equal access to the hospital services | 284 (70) | 89 (21.9) | 33 (8.1) |
| % Equity | 63% | 16% | 21% |
| 4. Perceived efficiency          | | | |
| In the BPR health care reform implementation process: | | | |
| 4.1.1. The best use of resources is observed | 175 (43.1) | 128 (31.5) | 103 (25.4) |
| 4.1.2. Wastage reduced and cost-effective interventions enhanced | 168 (41.4) | 76 (18.7) | 162 (39.9) |
| 4.1.3. Enough and competent health care workers and administrators are in place | 181 (44.6) | 98 (24.1) | 127 (31.3) |
| 4.1.4. Sufficient rooms are in place | 173 (42.6) | 98 (24.1) | 135 (33.3) |
| 4.1.5. Enough drugs and medical supplies, medical apparatuses and equipment | 146 (36) | 104 (25.6) | 156 (38.4) |
| 4.1.6. The staff have adequate knowledge on BPR objectives and principles | 141 (34.7) | 119 (29.3) | 146 (36) |
| 4.1.7. The staff is technically competent to implement the BPR reform | 141 (34.7) | 117 (28.8) | 148 (36.5) |
| 4.1.8. Supervisors assigned according to the BPR reform structure are capable and qualified | 141 (34.7) | 83 (20.4) | 182 (44.8) |
| 4.1.9. There is a clear channel of communication at workplace | 176 (43.3) | 51 (12.6) | 179 (44.1) |
| 4.1.10. Top management is competence to support the BPR reform | 166 (40.9) | 61 (15) | 179 (44.1) |
| 4.1.11. Top management involves the technical staff in decision making | 153 (37.7) | 55 (13.5) | 198 (48.8) |
| 4.1.12. Hospital management facilitates job-related training to staffs when necessary | 142 (35) | 43 (10.6) | 221 (54.4) |
| % Efficiency | 39% | 21% | 40% |
| 5. Perceived sustainability      | | | |
| After implementation of BPR health care reform: | | | |
| 5.1.1. The hospital management is committed to maintain the BPR reform | 187 (46.1) | 143 (35.2) | 76 (18.7) |
| 5.1.2. The hospital is able to continuously improve performance | 199 (49) | 108 (26.6) | 99 (24.4) |
| 5.1.3. The hospital acquires the required financial resources to insure sustainability | 181 (44.6) | 125 (30.8) | 100 (24.6) |
| 5.1.4. The hospital acquires the required staff to ensure sustainability | 170 (41.9) | 129 (31.8) | 107 (26.4) |
| 5.1.5. The hospital networking with external partners is strengthened | 122 (30.0) | 163 (40.1) | 121 (29.8) |
| 5.1.6. The hospital has the capacity to assemble and manage resources | 150 (36.9) | 130 (32.0) | 126 (31.0) |
| 5.1.7. The hospital increases satisfaction of patients and providers with clinical or administrative services | 170 (41.9) | 93 (22.9) | 143 (35.2) |
| 5.1.8. community-level partnerships are maintained | 129 (31.8) | 152 (37.4) | 125 (30.8) |
| 5.1.9. new organizational practices and policies are sustained | 118 (29.1) | 165 (40.6) | 123 (30.3) |
| % Sustainability | 69% | 33% | 28% |

BPR – business process reengineering
Efficiency

For efficiency, 175 (43.1%) respondents agreed that the best use of economic resources was achieved in the reform implementation process, and 181 (44.6%) of respondents agree that enough and competent health care workers were available in the reform implementation process. However, 179 (44%) respondents argued that the role and capacity of the hospitals’ high-level management in the reform implementation process was insufficient (Table 4). In general, 207 (51%) respondents claimed that there are no improvements in efficiency of health care services due to implementation of the reform.

Sustainability

From analysis of weighted median score, 192 (47.3%) respondents agree that the reform improved sustainability, while 214 (52.7%) of respondents disagree that the reform improved sustainability of the public hospitals (Table 4). For sustainability, based on the overall weighted median score, 203 (50%) respondents agree that the implemented BPR health care reform was not effective in improving the health care system performance of public hospitals. A relatively higher level of agreement (n = 199, 49%) was on the hospitals ability to continuously improve performance, while the rest of responses for this category of items were neutral.

Overall health care system

Based on the overall weighted median score result, 203 (50%) respondents claimed that the implemented BPR health care reform was not effective in improving the health care system performance of public hospitals. Analysis with the Kruskal-Wallis test indicates that there were difference in scoring tendency between respondents with different health profession (P = 0.001) and respondents with different duration of work in the hospitals (P = 0.026). Meanwhile, there were no differences in the scoring tendency between respondents with different levels of education (P = 0.539) and between respondents with different age groups (P = 0.235).

Predictors

With the backward stepwise logistic regression analysis, the important predictors that influenced implementation of the reform were financial resources (aOR = 3.54, 95% CI = 1.97-6.33), top management commitment and support (aOR = 2.27, 95% CI = 1.15-4.47), collaborative working environment (aOR = 1.77, 95% CI = 1.00-3.11), and information technology (aOR = 3.15, 95% CI = 1.57-6.32) (Table 5).

Table 5. Logistic regression analyses of the relative effect of BPR critical success factors on health service improvement

| Factors                        | Frequency   | df | Significance | Crude OR (95% CI) | Adjusted OR (95% CI) |
|-------------------------------|-------------|----|--------------|-------------------|----------------------|
| Adequate financial resources | Poor        | 145| 35           | 1 <0.001          | 11.72 (7.30-18.83)  | 3.54 (1.97-6.33)    |
|                               | Good        | 59 | 167          |                   |                      |                      |
| Top management commitment & support | Poor     | 162| 49           | 1 0.018          | 12.04 (7.55-19.22)  | 2.27 (1.15-4.47)    |
|                               | Good        | 42 | 153          |                   |                      |                      |
| Collaborative working environment | Poor   | 155| 72           | 1 0.050          | 5.71 (3.71-8.79)    | 1.77 (1.00-3.11)    |
|                               | Good        | 49 | 130          |                   |                      |                      |
| Flatter structure             | Poor        | 169| 63           | 1 0.092          | 10.65 (6.66-17.05)  | 1.80 (0.91-3.55)    |
|                               | Good        | 35 | 139          |                   |                      |                      |
| Information technology        | Poor        | 187| 90           | 1 0.001          | 13.70 (7.75-24.18)  | 3.15 (1.57-6.32)    |
|                               | Good        | 17 | 112          |                   |                      |                      |
| Training                      | Poor        | 175| 73           | 1 0.218          | 10.66 (6.56-17.35)  | *                    |
|                               | Good        | 29 | 129          |                   |                      |                      |

BPR – business process reengineering, CI – confidence interval, OR – odds ratio, df – degrees of freedom
*aOR not calculated as the variable had insignificant association in the bivariate analysis.
DISCUSSION

Healthcare services that are partly supported by the government were established in Ethiopia in the late 19th century. The health policy of the transitional government of Ethiopia that was approved in 1993 perceived the development of an acceptable standard of health service system as a critical element within the general health policy. Lately, based on this health policy, BPR health care reform rose and endeavoured to satisfy health care quality needs of the government and citizens. It was yet to be assessed for its implications and opportunities to improve.

The findings of this study proved that the implemented BPR health care reform struggles to meet health care quality requisites. The majority of the anticipated patient-provider interactions delineated in the reform document have not been achieved. According to the reform guideline document, emergency patients coming to public hospitals at any time ought to get the required services without any delay, whereas outpatients ought to complete treatment services within two hours and patients' admissions should be carried out within 10 minutes [4]. Similarly, patients who require specialized health care services need to get the services within 72 hours of visiting the hospitals. The reform document conjointly urged for the satisfaction of patients with health care services and their rights fully respected. Though we did not calculate the turn-around-time of care for each patient, we boldly deduced from responses of the health care providers that there exists a high gap in meeting patients' needs. Prior to designing and implementing the reform, the Ethiopian government was able to conduct SWOT analysis and identify major gaps that would impact patient-provider interactions, and amongst this was longer patients waiting time [4], and this study revealed that the challenge has not been addressed. Recent studies conducted in Ethiopia also reported critical gap in patient's waiting time and patient-provider interactions in public health care facilities where the studies were conducted [56,57]. A patient-provider trust would generate smooth interaction between the two parties and further insists the community decide to engage in prevention and control interventions in the general health care systems [58-60].

The implication of the BPR health care reform was found to be poor in improving the interaction between providers and the hospital management. Appropriate and timely feedback to staff, clear job descriptions, motivation, job satisfaction, and staff promotion were not improved as providers anticipated. The finding also concurs with previous studies done in Ethiopia [61-63]. Poor provider-management interaction in public hospitals would compromise the maximum commitment and engagement providers could exert to their duties. This in turn leads the hospitals not to function to the best of their abilities. It is crucial to actually listen and respond to providers' needs to ensure high levels of engagement throughout the hospitals. If there are factors which are beyond the control of providers, the possibilities that they become client-oriented, productive, skilled, and competent to perform their duties could lessen [6].

There were severe gaps in the implementation process of the health care reform which contributed negatively to service quality. For instance, high level supervisors had given the implementation process little attention, and this actually contradicts with BPR reform standards. The management's support and involvement in all phases of a reform is essential for lifting technical competency of staffs and enhancing outcomes [32,50,64].

In terms of structure, the reform could not enable the hospital to become a better treatment facility than it was before, though there were some recognized improvements. As well, the way the hospitals were re-structured did not match the daily work flow of the hospitals as anticipated. In general, there have been many service quality gaps identified in the public hospitals that implemented health care reform, though there were a few improvements as well. The findings were in line with previous findings from other studies done in Ethiopia [6,58,65] and elsewhere [66,67].

Access to health care services is the other dimension of health system performance that the reform ought to address. In view of the physical dimension, the reform was able to organize the hospitals into three core case teams; namely, emergency, outpatient, and inpatient. The outpatient core case team consisted of eight activity-specific case teams, and inpatient core case team consisted of nine case teams. Though the case teams existed in the hospitals, those with major furniture, supplies, and infrastructure were considered a major implementation challenge of the health care reform as providers indicated. This finding supports other studies conducted in Ethiopia [65,68]. Financial management systems raised another key concern in the reengineered public hospitals. The result indicated that the reform was able to increase income of the hospitals to some extent. However, the hospitals' health care financing system remained weak. Financial mobilization schemes of the hospitals did not centre on evidence-based plans and their
budget consumption system was stagnant, which was in support of previous studies in Ethiopia [57,69,70]. Some hospitals that implemented the reform are suspected of corruption, and this should be further investigated by the authorized government institution. For the cultural dimension of health care access, it was indicated that patient discrimination in the hospitals highly decreased since the reform was implemented. With this, the BPR health care reform was capable of addressing the cultural dimensions of health care reform performance. In general, although the reform was capable of producing meaningful changes in the cultural dimension and fairly in the approachability dimension of health service systems, it was not able to achieve the overall access to health care services.

Healthcare equity was studied to analyse the availability of adequate resources and systems in the hospitals, which would fairly benefit every citizen. The findings of the study indicate that medical care costs of the hospitals were reasonable. The reform enabled financial procedures of the hospitals to endorse free services to patients who could not afford them. The reform also allows patients with different socio-economic, demographic, ethnic, and/or gender groups to have equal access to the hospitals’ services. However, the reform was not able to address equity for disabled patients and there has been limited infrastructure setup for disabled patients. The overall findings of the study show that the implemented BPR health care reform was relatively fair at meeting the depicted health equity needs.

Efficiency was the other dimension of health system performance assessed in this study. The effect of the BPR health care reform on improving efficiency of public hospital services was shown to be unsatisfactory. While enough and competent health care workers were not in place to efficiently implement the reform efforts, efforts exerted by the hospitals’ high level management in the reform implementation process were insufficient. It was also noticed that management did not enrich knowledge and technical competency of the staff to enable them to efficiently implement the reform. These challenges, together with high wastage and inefficient use of resources, led the reform to have a little effect on efficiency. Similarly, the reform did not ensure sustainability of public hospitals’ services to continue functioning and initiate changes in order to continuously improve performance. The commitment of hospitals’ management to maintain the BPR reform, readiness of financial resources and qualified staff, existing network of the hospitals with external partners, and satisfaction of patients and providers with existing hospitals’ clinical and administrative functions were revealed as very weak to ensure sustainability of the hospital services.

In summary, the health care reform implemented in public hospitals of Ethiopia did not improve quality, access, efficiency, and sustainability of health services, while a relatively fair improvement was shown on equity.

This study has some limitations. The study did not solicit the views of administrative staff and we think their inputs may have further strengthened the study findings, while the possible effect of this has been mitigated by inclusion of health care providers who also have administrative role. The study bases the perspectives of the respondents that may increase the likelihood of recall biases. Despite these, the study generates important findings in the area of health care reform.

CONCLUSIONS

It was acceptable that the Ethiopian government made its level to improve the quality of care through BPR health care reform. The reform has laid the groundwork for health system improvement but progress was slow and the health care delivery system was still fragmented. Healthcare reform efforts in such settings are feasible, but with regular mapping of programmatic outcomes and bringing a common understanding of the reform among stakeholders. Such efforts in resource-limited settings need concrete follow-up and supports consistent with national and global needs. Local governments should strengthen collaborations with global health partners for empirical interventions against the major gaps detracting their health care system.
PAPERS

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