

The Impact of Quality Improvement on Healthcare Delivery in Ghana: A Secondary Data Analysis of Under-5 Mortality Rate Reduction

Kumah Isaac Rock¹, Boison David King², Asiedu Esther²

¹Ghana Health Service, Eastern Region

²Ghana Technology University College, Accra.

Abstract: Purpose – The purpose of this study is to examine the impact and sustainability of the National Catholic Health Service (NCHS) Quality Improvement (QI) program on the reduction of under-5 mortality rates (U5MR) in Ghana. U5MR is the survival rate of children under the age of five, and it is an important indicator in the determination of a nation's health status. It is also the Sustainable Development Goal 3 (SDG 3) to be achieved by 2030. QI in healthcare is a systematic and continuous approach to eliminate errors in the processes of providing health service, in other to improve health outcomes such as U5MR. QI process involves learning from experiences. It is a journey that never ends.

Design/Methodology/approach – The study takes the form of a descriptive case-study design, employing a quantitative approach. The study sample consists of nine Catholic hospitals used by the NCHS to test a QI methodology on U5MR reduction. The nine hospitals were their worst-performing hospitals in U5MR. Secondary data on U5MR spanning a period from 2008 to 2015 were collected from the hospitals and analysed descriptively using Microsoft Excel.

Findings – Overall, the implementation of the quality improvement program between 2008 and 2010 was determined to be a great success. Seven out of the nine pilot hospitals made remarkable reductions in U5MR between 92% and 65%. Sustaining these improvements was a challenge for the majority of the hospitals. Six out of the nine hospitals saw sharp increases in U5MR during the post-implementation stage (2011-2015). For example, a hospital with U5MR of 1.89 per 1000 live births in 2010 shot up to 21.19 per 1000 live births in 2011. Only three out of the nine hospitals sustained improvements beyond 2010. Lack of continuous supervision and a sustainability phase of the QI model contributed to the poor performance beyond 2010.

Practical Implication – For healthcare practitioners, this study points to factors to consider when implementing QI models in healthcare – for example, the need to include a sustainability phase in the implementation. This will ensure that improvements made during the implementation are sustained and further enhanced. This way, the SDG 3: zero preventable under-5 mortality by 2030 could be achieved.

Originality/Value – QI methodologies are new to the healthcare system in Ghana. Also, studies on the application of QI on healthcare delivery in Ghana is very limited. This study contributes to the understanding of the impact of QI efforts in healthcare delivery in Ghana. The study reveals the importance of a QI method in healthcare and how it should be implemented. In this study, the performance of the nine hospitals during the implementation and post-implementation stages were analysed. Thus, not only was the impact of the program measured but also its sustainability.

Keywords: Quality Improvement, management commitment, under-5 mortality rate, sustainability, Project Fives Alive!.

I. INTRODUCTION

The service industry, including health, is one of the fastest-growing industries in recent times. This rapid growth has brought up important challenges including the need to raise standards of quality [1], [2]. Despite this, the health sector has been left behind in its ability to catch up with new management innovations for improving quality of care [3]. The inadequacies in quality improvement efforts are evident in the gaps in the quality of healthcare received by patients, and problems with patient safety [4]. Despite the challenges, there are many opportunities to improve healthcare systems by addressing the shortcomings in the quality of healthcare [5], [6]. Lately, due to the impact of poor healthcare delivery and increasing awareness, Quality Improvement (QI) is gaining popularity in the health sector globally. It aims to make healthcare safer, effective, and improve the quality of care [7]. Improving the quality of healthcare delivery has been a priority of the Ghana Ministry of Health (MoH) since 1989 [8]. Although the country has made significant advances in increasing service coverage, this has not yielded the anticipated improvements in health status, and the quality of health services has been declining. Patient dissatisfaction is evident from the low use of health facilities [8]; [9].

The Ghana Health Service (GHS) began Quality Assurance (QA) initiatives in 1994, to improve the quality of healthcare given to patients. A Healthcare QA Manual was developed in 2002 to enhance standardization, training, and implementation of QA throughout Ghana. The QA approach focused on improving the quality of service delivery from the client's perspective [10]. Despite these QA interventions, there are still disturbing performance gaps. Bannerman et al. (2013), suggest that the aspiration to provide sustainable quality and safe healthcare faces formidable challenges. The increasing need to sustain and improve quality of care demand the need to integrate Continuous Quality Improvement approaches into routine health service delivery. It appears that little has been achieved with the QA Program implementation in GHS as far as child welfare is concerned [11]. Patients continue to make several complaints about the quality and safety of healthcare received [10]; [12]. The survival rate of children under the age of five is an important indicator in the determination of a nation's health status (United Nations [UN], 2000). It is, therefore, not surprising that under-5 mortality (U5M) is the Millennium Development Goals 4 (MDG 4) and Sustainable Development Goals 3 (SDG 3). The high rate of U5M, however, continues to be a nightmare in Ghana. The U5MR in Ghana in 2018 stands at 50.81 deaths per 1,000 live births. Even though U5MR in Ghana has seen significant improvement over the years, it is still high per WHO standard. Even though most African countries including Ghana were unable to achieve the 2015 Millennium Development Goal target for under-5 mortality [13], the SDG 3 target of zero preventable under-5 mortality by 2030 can be achieved with a little more effort and enhanced methodology.

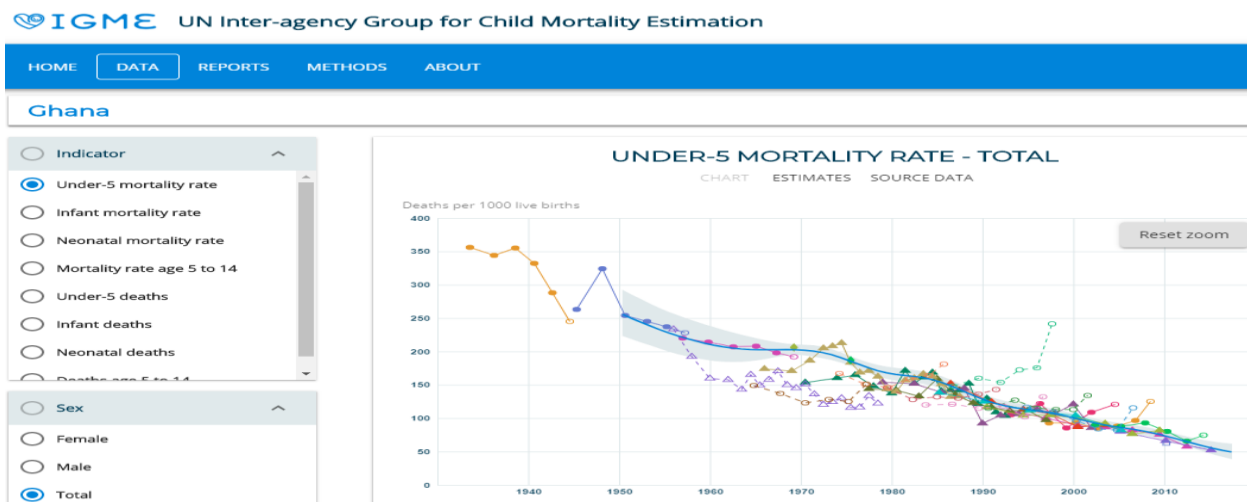


Figure 1: Screenshot showing U5MR trend in Ghana

Source: WHO

In 2008, the NCHS launched a quality improvement (QI) program named Project Fives Alive! to reduce under-five mortality. Project Fives Alive! was a partnership programme between the Institute for Healthcare Improvement (IHI) and the NCHS, to reduce morbidity and mortality in children less than five years of age (Under-5) in Ghana. Project Fives Alive! was a seven-year project funded by the Bill & Melinda Gates Foundation, and worked in collaboration with Ghana Health Service (GHS) to achieve its objectives. It was implemented in four consecutive waves (phases) to reach all regions in Ghana. By applying QI methods, Project Fives Alive! sought to accelerate Ghana's efforts to achieve the MDG

4. The Millennium Development Goal Four aimed to reduce under-5 mortality by two-thirds from its 1990 baseline of 110 deaths per 1,000 live births to less than 40 deaths per 1,000 live births by 2015 [14]. The QI Program initially implemented in the nine pilot hospitals achieved remarkable results in under-five mortality reduction between 2009 and 2012 [15].

II. LITERATURE

Model for Improvement

Project Fives Alive! launched by the NCHS in 2008 adopted the Model for Improvement to improve U5MR in Ghana. 'The Model for Improvement' was developed by Associates in Process Improvement (API). The model is known to effectively and efficiently manage change [16]. It is a simple yet powerful tool for accelerating improvement in healthcare [17]; [18]. It is a change methodology that has gained much popularity in healthcare due to its outstanding impact on the quality of care. The Model for Improvement has two parts. The first part presents three questions; (1) What are we trying to accomplish? (2) How will we know that a change is an improvement? and (3) what changes can we make that will result in improvement? These questions are intended to help QI managers to avoid focusing on the solution and neglecting the change process [19]. These questions are fed into the second part of the Model, which is the Plan-Do-Study-Act (PDSA) Cycle [20]; [21]. The implementation of the Model goes through forming a team, setting objectives, establishing measures, selecting changes, implementing changes and spreading the changes [22]. The PDSA cycle was originally developed by Walter A. Shewhart as the Plan-Do-Check-Act (PDCA) Cycle. Edward Deming modified the PDCA to PDSA replacing "Check" with "Study" [23]. PDSA Cycles are a small test of change used as part of a continuous improvement approach [24]. PDSA has been widely used as the main framework for the collaborative approach in healthcare and has resulted in improved health delivery by improving processes and outcomes [23]. PDSA fits very well with other QI approaches as it is suggested in some stages of both Six-Sigma and Lean. It has been relatively studied in terms of its application in healthcare compared to the other approaches [20]; [25].

Change Management Models in Healthcare Research

Some Change Management Models were recently developed in healthcare research. They include the Canadian Health Service Research Foundation's (CHSRF) Evidence-Informed Change Management Approach, Canada Health Infoway's Change Management Framework, and Lukas et al's Organizational Model for Transformational Change in Health Systems [26]. The CHSRF's Evidence-Informed Change Management Approach is a model aimed at sharpening management's leadership role in supporting change in healthcare organizations. The Model has four implementation stages: Planning, Implementing, Spreading, and Sustaining. At the planning stage, change agents should seek to understand the content of the change initiative and how to implement it. They should identify partners that may support or oppose the change initiative and how to work with them. The agents should prepare the whole organization to accept the change. Finally, they should assess the resources; financial and human capital needed to implement the change program [27]; [26]. The Canada Health Infoway Change Management Framework is aimed at developing a common and unified roadmap for implementing change programs in healthcare organizations. "Governance and Leadership; Stakeholder Engagement; Communication; Workflow Analysis and Integration; Training and Education; and Monitoring and Evaluation" are the six elements that should be considered to making change objectives attainable [28]; [26]. An organization's governance and leadership guide its course. Change initiatives in an organization should start at this level. This way the change agenda can influence the culture of the organization. A change objective stands a better chance to succeed when the organizational culture buys into it. Stakeholder Engagement refers to the interaction with those who play a part in the implementation of the change agenda and those to be affected by it. Stakeholder engagement is crucial in managing change because engaging these stakeholders will make them understand the program which can reduce resistance and increase support for it. Communication refers to the feedback provided on the progress of work on the implementation of the change program to stakeholders. This is intended to build trust and keep stakeholders up to date on the progress of work. Workflow Analysis and Integration represent the analysis of how people, processes, and technology are integrated to achieve the intended goal. This analysis is aimed at identifying bottlenecks within the system for improvement. Training and Education refer to the tools used to prepare the change agents to implement the program. It is the means to impart the needed skills and information to the employees responsible for leading the change agenda. The monitoring part of Monitoring and Evaluation signifies observing and appraising the impact of the process. The implementation of the change agenda is monitored to ensure conformance as planned. Evaluation, on the other hand, is carried out to identify shortfalls in the implementation of the program, to make way for adjustment to fine-tune the process [28]; [26].

The Organizational Model for Transformational Change in Health Systems is aimed at sustaining patient care improvement by bringing about change in the components of an organization. These components are operational functions and processes, culture, infrastructure, mission, vision, and strategies [29]. The model suggests four elements which can bring about positive change in an organization. One of the four elements is the impetus to transform. This implies the willingness of the organization to change by identifying internal and external factors pointing to change. Another element is leadership commitment to quality. Senior management drives change and without them committing to the process, little can be achieved. Yet, another factor is the use of an improvement initiative that actively involves employees, as they are the agents to drive the change process. The Model proposes that employees should be actively involved in the process to limit resistance to it, and promote its acceptance. Last but not least, is the integration of units/departments to be affected by the change program. Bringing all affected units onboard will promote the success and sustainability of the change desired [29]; [26]

Common Stages in the Change Management Process

A study of the change management models in healthcare research revealed some common stages in the implementation of QI models. These include the planning, implementing, spreading and sustaining stages [30]; [29]; [22]; [27]; [26]. The planning stage entails putting together a team of agents of change, setting aims, gathering support from key players, and allocating resources for the program. The implementation stage consists of putting into action the planned objectives. At this stage, leadership commitment to the process is essential. Resources allocated to the venture are used and monitoring and evaluation are fully implemented. The spreading stage entails extending the implementation to other facilities. In most cases, the implementation stage is first done on a pilot basis before expanding it to other facilities. Following the success of the pilot phase, the initiative is then implemented on a larger scale. The sustaining stage, which is the last, involves evaluating and adjusting the change process to ensure continuous improvement. This stage aims to institutionalize the new outcome and influence the organizational culture by making it the new standard of operation. At this stage, the change objectives would have become part of the organizational culture resulting in continuous improvement [30]; [29]; [22]; [27]; [26].

Table 1: Comparison of Model for Improvement with the Change Management Models in Healthcare Research

Common Stages in the Change Management Process	Associates in Process Improvement’s Model for Improvement	CHSRF’s Evidence-Informed Change Management Approach	Canada Health Infoway’s Change Management Framework	Lukas et al.’(2007) Organizational Change Model
Planning Stage	Evident	Evident	Evident	Evident
Implementation Stage	Evident	Evident	Evident	Evident
Spreading Stage	Evident	Evident	Not Evident	Not Evident
Sustaining Stage	Not Evident	Evident	Evident	Not Evident

(Source: Author’s construction, 2018)

Table 1 shows that the Associates in Process Improvement’s Model for Improvement implemented by NCHS satisfies the first three stages of the common stages in the Change Management Process. It shows the planning, implementation and spreading stages but silent on the sustaining stage. The sustaining stage involves integrating the change components into the organizational culture. Some researchers argue that for quality improvement to be sustained in an organization, the culture of the organization should be influenced to accept the new standards of quality introduced [31]; [32]; [33]; [34]; [35]; [27]. This is not evident in the Model for Improvement used by the NCHS. Comparing it with the other three models, only CHSRF’s Evidence-Informed Change management approach satisfies all four stages. The Canada Health Infoway’s Change Management Framework is silent on the spreading stage, whilst [29] Organizational Change Model is also silent on the spreading and sustaining stages.

The success of QI Initiatives in Healthcare

The Institute for Health Improvement (2015) argues that Quality Improvement (QI) programs have gained much popularity in healthcare due to their impact on the quality of care and patient safety. However, some studies show that the successes of QI methodologies in organizations vary; application of QI methodologies have seen varying levels of impact and in some cases, even failure is also experienced [36] ; [37]. It is argued that the implementation of QI methods in healthcare has not seen great success. This is because some implementers fail to understand the necessity and impact of cultural and structural adjustments in the success of the implementation of such programs [38]; [39] . Changing the organizational culture as part of the change process is vital to ensure that the desired objective is sustained. This assertion is supported by several researchers such as [31]; [32]; [33]; [34]; [35] and [27]. [40] also suggest that good clinical supervision in healthcare has the likelihood to improve staff self-monitoring which is an essential element needed to ensure continuous quality improvement. The success of QI initiatives can be affected by some other factors: [7] argue that when organizations perceive an improvement program as a project with a completion date, sustaining the desired outcome may be difficult. [41], maintains that a lack of poor systems for detecting the root of quality problems and solving them are the core factors for failure of quality improvement initiatives. [42] and [43] are also of the view that strong and committed leadership can make quality improvement initiatives in healthcare organizations succeed. [44] suggest that resistance to future quality improvement initiatives may arise when positive QI outcomes are not sustained.

III. METHODOLOGY*Sample and Data Collection*

The NCHS is an ideal context for this study because it was the first in Ghana to broadly apply a QI program to reduce U5MR (Sodzi-Tetteh et al. 2015). This study is based on secondary data collected from nine Catholic hospitals used by the NCHS to test its QI program. The hospitals include Catholic Hospital in Battor, St. Francis Xavier Hospital in Assin Fosu, Our Lady of Grace in Breman Asikuma, Margaret Marquart Hospital in Kpando, Holy Family Hospital in Nkawkaw, Matthias Hospital in Yeji, St Martin de Porres Hospital in Eikwe, Holy Family Hospital in Berekum, and Holy Family Hospital in Techiman. These nine pilot hospitals were their worst-performing hospitals in U5MR at the time. Under-5 mortalities for the hospitals were recorded daily and aggregated into a monthly and then into yearly data. The available secondary data on under-5 mortality rates on the nine pilot hospitals were collected from the NCHS database. Yearly under-5 mortality rates were collected for eight (8) years; three years of implementation of the QI method (2008-2010) and five years of post-implementation (2011-2015). The post-implementation period was included to be able to find out whether the impact was sustained. The sample size of the hospitals used in the study covered all nine pilot hospitals used by the NCHS.

Data Analysis

Analyses of data were performed using Microsoft Excel. A percentage decrease formula; $\{(old\ value - new\ value) \times 100 \div old\ value\}$ (<https://www.skillsyouneed.com/num/percent-change.html>) was also used to calculate the percentage decrease in U5MR for each of the nine hospitals from 2008 to 2010 which marked the QI implementation period and post-implementation period from 2010 to 2015 (see table 2). Tables and graphs were used to show the trends and performances of the hospitals in U5MR.

Under-5 Mortality Indicators

Under-5 mortality rates (U5MR) were calculated yearly from 2008 to 2015 for each of the hospitals. Indicators used for the calculation of U5MR included the number of live births of new-borns during the year of calculation (LB), total admissions of all children below the age of five during the year of calculation (ADM), and total deaths of all children below the age of five during the year of calculation (D). The U5MR for each year was calculated per 1000 live births as defined by UNICEF (UNICEF, 2016) using the formula; under-5 Deaths divided by under-5 Admissions and live births per 1000

$$\left\{ \frac{D}{ADM+LB} \times 1000 \right\} \text{ (see appendix 1 to 8).}$$

	A	C	D	Q	R	S	T	U	V	W	X	Y	Z	AA
3	2008	Name of Facilities	Location	LIVE BIRTH		INP<1	INP 1 - 4	INP <5	D <1	D 1 - 4	D <5	Adm + LB	IMR	U5MR
20	1	Catholic Hospital, Battor	Battor	1,402		560	646	1,206	50	15	65	2,608	19.17	24.92
21	2	St. Francis Xavier Hospital	Assin Foso	2,150		707	1,226	1,933	43	18	61	4,083	10.53	14.94
22	3	Our Lady of Grace Hospital	Breman Asikuma	1,409		439	895	1,334	46	37	83	2,743	16.77	30.26
23	4	Margaret Marquart Cath. Hosp	Kpando	1,269		237	572	809	17	17	34	2,078	8.18	16.36
24	5	Holy Family Hospital	Nkawkaw	2,375		652	1,116	1,768	66	13	79	4,143	15.93	19.07
25	6	Matthias Hospital	Yeji	893		388	1,314	1,702	26	53	79	2,595	10.02	30.44
26	7	St Martin de Porres Hospital	Eikwe	1,081		1,195	2,091	3,286	77	67	144	4,367	17.63	32.97
27	8	Holy Family Hospital	Berekum	1,038		1,179	579	1,758	71	32	103	2,796	25.39	36.84
28	9	Holy Family Hospital	Techiman	1,206		653	1,867	2,520	29	55	84	3,726	7.78	22.54

Figure 2: Screenshot of Under-5 Mortality Rate Calculation in Excel

IV. FINDINGS

Results

Percentage Decrease in U5MR

Table 2 shows the nine hospitals and their performances in U5MR from 2008 to 2015. It also shows the percentage decrease in the mortality rate during the implementation and post-implementation stages. Percentage decreases in U5MR for all the nine hospitals were positive during the implementation stage. One hospital decreased U5MR by 91.62%, two hospitals decreased between 81% and 86%, three hospitals decreased between 72% and 75%. one other hospital decreased by 64.99%, another by 25.83% and the least by 7.46%. However, only three hospitals achieved a positive impact during the post-implementation stage. The three further decreased U5MR between 13% and 30%. The remaining six hospitals, on the other hand, made negative impacts. The six worsened in performance with a percentage decrease ranging between -90.82% and -970.37%.

Table 2: The Percentage Decrease in U5MR of Nine Catholic Hospitals from 2008 to 2015.

Hospitals	QI Implementation Stage				Post Implementation Stage						
	2008	2009	2010	% Decrease	2010	2011	2012	2013	2014	2015	% Decrease
Catholic Hospital, Battor	24.92	25.28	23.06	7.46	23.06	19.77	13.52	11.97	12.37	16.14	30
St. Francis Xavier Hospital, Assin Fosu	14.94	14.14	11.08	25.83	11.08	8.82	7.9	7.7	4.17	9.57	13.63
Our Lady of Grace, Breman Asikuma	30.26	18.86	7.37	75.64	7.37	6.51	4.89	6.67	5.1	5.45	25.05
Margaret Marquart Hospital, Kpando	16.36	10.59	3.82	76.65	3.82	7.31	7.95	5.98	12.03	13.57	-225.24
Holy Family Hospital, Nkawkaw	19.07	15.77	3.45	81.91	3.45	16.24	16.25	18.68	16.06	14.47	-319.42
Matthias Hospital, Yeji	30.44	24.3	8.49	72.11	8.49	21.92	11.52	12.87	13	16.2	-90.82
St Martin de Porres Hospital, Eikwe	32.97	28.15	11.54	64.99	11.54	19.24	19.1	24.67	22.11	23.28	-101.73
Holy Family Hospital, Berekum	36.84	25.41	5.07	86.24	5.07	22.65	15.61	12.36	11.06	13.3	-162.33
Holy Family Hospital, Techiman	22.54	16.3	1.89	91.62	1.89	21.19	21.32	22.14	25.27	20.23	-970.37

Figure 3 is a line graph showing the performances of the nine hospitals in U5MR from 2008 to 2015. Two hospitals; Battor Catholic Hospital and St. Francis Xavier Hospital show a gradual decline in U5MR from 2008 to 2014. The remaining seven hospitals, on the other hand, show a drastic reduction from 2008 to 2010. Beyond 2010, Battor Catholic Hospital and St. Francis Xavier Hospital continued to experience a slight decline in U5MR to 2014 with a slight rise between 2014 and 2015. Our Lady of Grace Hospital experienced a little rise in 2013 but declined again in 2014 and 2015. Margaret Marquart Hospital also experienced a slight rise in 2011, declining a little in 2013 but rose sharply between 2014 and 2015. The remaining five hospitals all saw a steep rise in U5MR from 2010 with some slight reductions.

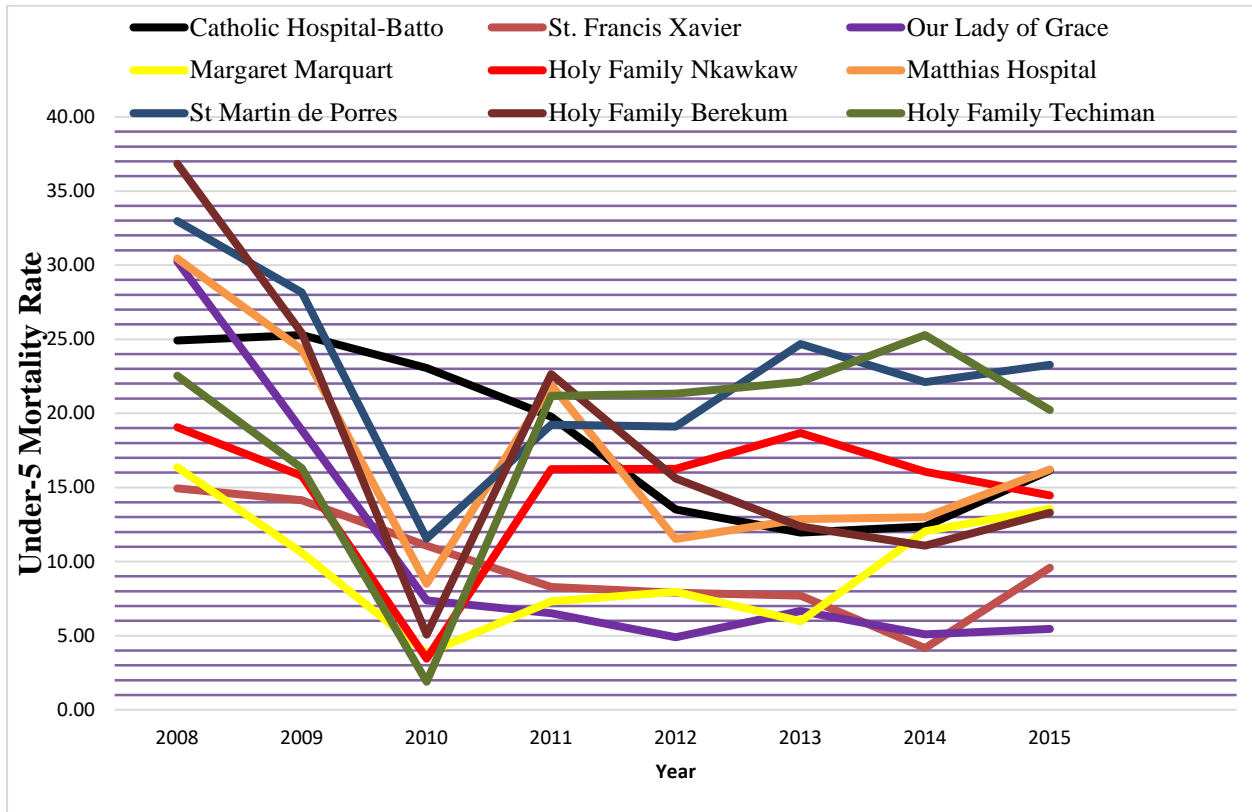


Figure 3: U5MR Performance of Nine Catholic Hospitals from 2008 to 2015

Figure 4 is a bar graph showing the implementation stage of the QI program and how the hospitals performed. Holy Family Hospital, Techiman achieved the highest improvement in U5MR with a 91.62% decrease. Holy Family Hospital, Brekum, and Holy Family Hospital, Nkawkaw, followed in performance with 86.24% and 81.91% decrease respectively. Three hospitals; Our Lady of Grace, Margaret Marquart and Mathias also achieved between 72% and 76% reduction in U5MR. St Martin de Porres Hospital, Eikwe, followed with 64.99%. St. Francis Xavier Hospital, Assin Fosu came next with a decrease of 25.83%. The Catholic Hospital, Battor had the least reduction of 7.46%. The improvements in U5MR by almost all of the hospitals were remarkable between 2008 and 2010.

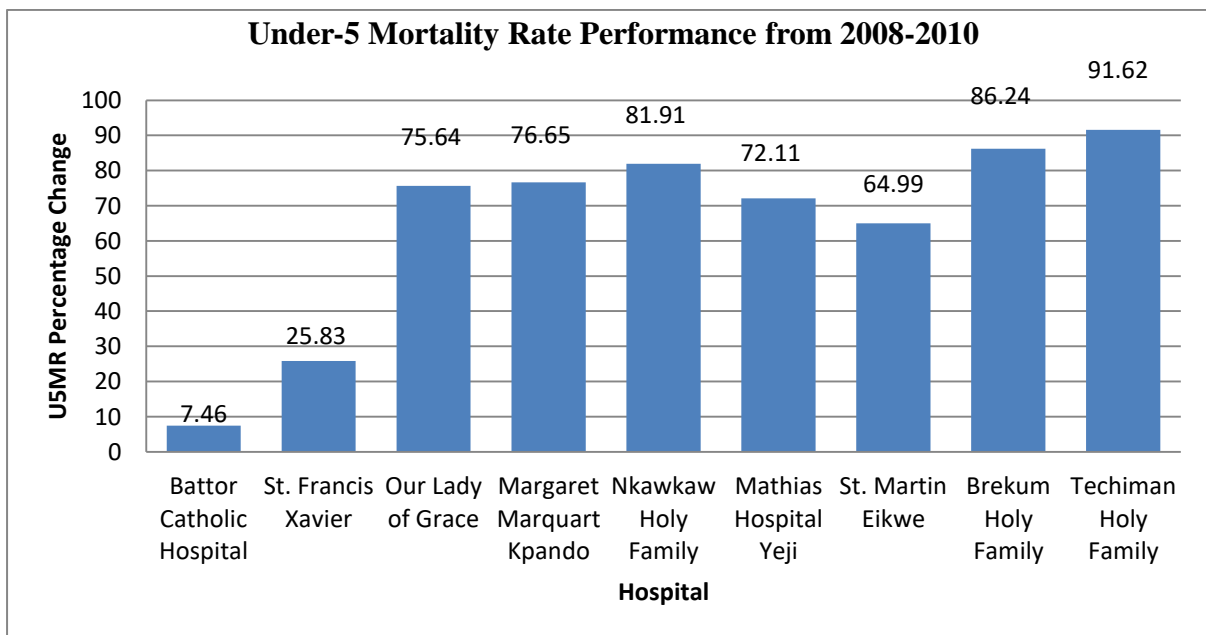


Figure 4: Under-5 Mortality Rate Performance from 2008-2010

When the implementation stage came to an end in 2010, the hospitals involved were challenged to sustain the improvements made in U5MR, and continue to further improve upon the successes achieved. Figure 5 shows the bar chart of the post-implementation stage of the QI program. Out of the nine hospitals, only three were able to achieve a positive reduction in their U5MR from 2010 to 2015. They are Battor Catholic, Our Lady of Grace, and St. Francis Xavier Hospitals. These three hospitals gained a positive reduction in U5MR by 30%, 25.05%, and 13.63% respectively. The remaining six hospitals rather showed huge negative results in U5MR. Mathias Hospital achieved 90.82% increase in U5MR. St. Martins de Pores Hospital increased by 101.73%, Berekum Holy Family Hospital increased by 162.33%, Margaret Marquart Hospital increased by 225.24%, Nkawkaw Holy Family Hospital increased by 319.42% and Techiman Holy Family Hospital increased by 970.37%. This clearly shows that the majority of the hospitals could not sustain the improvements made during the implementation stage of the program.

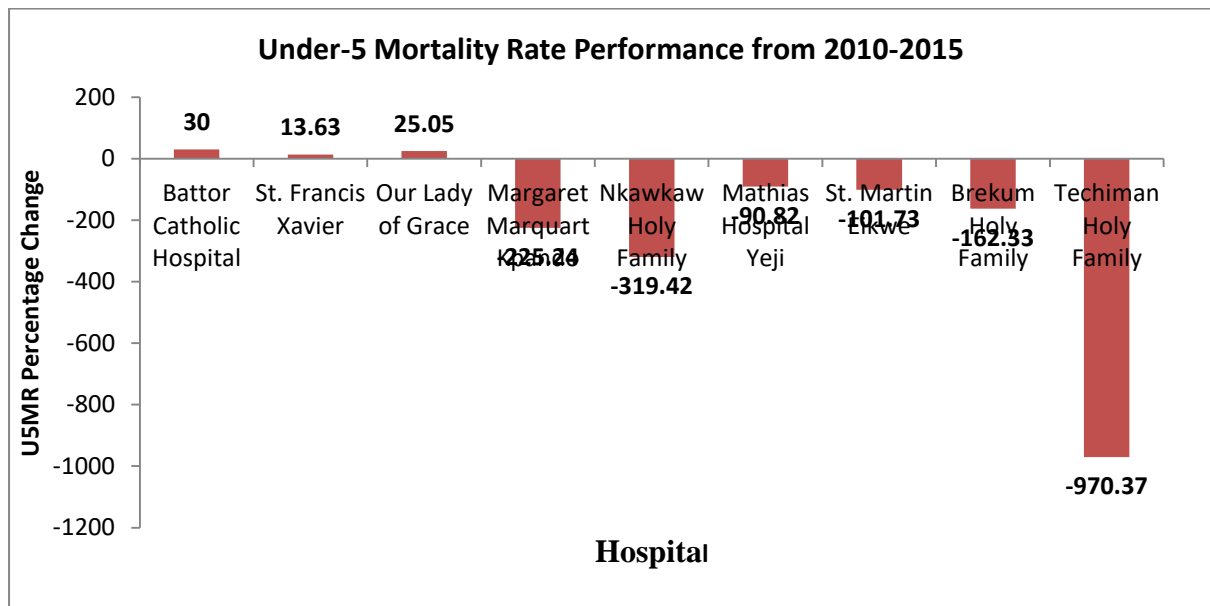


Figure 5: Under-5 Mortality Rate Performance of nine hospitals from 2010-2015

V. DISCUSSION

The purpose of this study was to assess the impact of the QI program implemented by the NCHS using the Model for Improvement to reduce U5MR. The findings from the implementation of the Model were discussed in line with the Change Management Models in Health Research. These Models are Lukas et al.'s Organizational Model for Transformational Change in Health systems, Canadian Health Service Research Foundation's Change Management Approach and Canada Health Infoway's Change Management Framework.

The Impact of the QI Program

The study showed that the implementation of the QI Program by NCHS in the nine pilot Catholic hospitals to reduce under-five mortality made a great improvement from 2008 to 2010, which marked the implementation stage. During this period, the least performing hospitals decreased U5MR by 7.46% and 25.83% respectively. The remaining six hospitals decreased their U5MR between 72% and 91%. These remarkable improvements in U5MR occurred during the implementation stage of the QI Program when monitoring and supervision by NCHS were at their peak. [40] suggest that clinical supervision in healthcare has the likelihood to improve staff self-monitoring which is an essential element needed to ensure continuous quality improvement. The success of the program up to 2010 could be attributed to the intense monitoring by the NCHS, which kept the hospitals on their toes and to be up and doing. Constant monitoring and supervision are a key feature of the Model for Improvement at the implementation stage [22]. This feature of the Model for Improvement is also common to the Healthcare Change Management Models reviewed (see pages 3, 4 & 5). Another shared feature of the Model for Improvement and the Change Management Models is the strong planning stage before the implementation of the program. The planning stage entailed identifying the need to transform, effective change education, identifying and training change agents, leadership commitment to change, and resource allocation, among others [30]; [29]; [22]; [27]; [43]. The success of the implementation stage depends largely on a good planning stage. These common

features discussed above show that the QI model used by the NCHS conforms to the features (planning and implementation stages) of the Healthcare Change Management Models. This may have accounted for the tremendous success during the implementation stages. The QI pilot program came to an end in 2010 with the expectation that the hospitals will continue the implementation due to the great improvements made from 2008 to 2010. Surprisingly, the majority of the hospitals saw a great decline in performance from 2010 to 2015. This significant reverse in U5MR performance happened just after the constant monitoring and supervision by the NCHS stopped. Again, only three hospitals out of the nine were able to achieve further improvement in U5MR (positive impact) between 2010 and 2015. Their percentage decreases in U5MR during this period were lower compared to the period of monitoring by NCHS. The three hospitals with positive impact during the sustaining stage include Battor Catholic Hospital, St. Francis Xavier Hospital and Our Lady of Grace Hospital. The remaining six hospitals declined in U5MR performance (negative impact) and three hospitals namely; Nkawkaw Holy Family Hospital, Eikwe, St. Martin de Porres Hospital and Techiman Holy Family Hospital became worse than they were at the introduction of the QI program.

It is obvious that when the institutions continued the implementation without the constant monitoring and supervision from NCHS, performance in U5MR slumped, and even deteriorated in most of the hospitals (see Figure 5). As indicated by [40], effective supervision in healthcare can greatly improve staff self-monitoring which is needed to ensure the success of continuous quality improvement.

Sustaining the Impact of QI Implementation

Comparing the Model for Improvement with the Change Management Models in health research (see table 1), it became evident that though the sustaining stage of QI implementation is a significant feature of the Change Management Models, the Model for Improvement was silent on it [30] ; [29] ; [22] ; [27]. It was, however, more evident in the CHSRF's Evidence-Informed Change Management Approach and Canada Health Infoway's Change Management Framework [30]; [27] ; [28]. When this major feature of change models appears missing in QI initiative, improvements made may not be sustained, and the continuous improvement expected during the post-implementation stage would be non-existent. The poor performance of most of the hospitals in U5MR after the implementation period may be due to the lack of an in-built sustaining element in the model used by the NCHS. Quality improvement program implementation should be seen as an ongoing journey that never ends. The perception that an improvement program is a project with a completion date is defeating and a contributing factor to the poor performance of such programs [7]. Evidently, in this Study, the QI program implemented by the NCHS may have been perceived to have come to an end when the constant supervision by the NCHS stopped. This may have accounted for the huge decline in performance during the post-implementation stage. Hughes (2008) argues that the lack of poor systems for detecting the root of quality problems and solving them are the core factors for failure of QI initiatives. There is, therefore, the need to ensure that QI initiatives strengthen the day-to-day healthcare delivery system to ensure sustainability and continuous improvement. [42] and [43] also suggest that strong and committed leadership can make quality improvement in healthcare succeed. Healthcare managers must, therefore, show a strong commitment to QI initiatives which is needed to drive the QI agenda and ensure continuous improvement. [44] posit that when changes that improve the quality of healthcare are not sustained, it is not only a waste of resources but may also increase resistance to future QI initiatives. It is, therefore, crucial to ensure that achievements made in QI initiatives are sustained to safeguard employee participation and commitment to the QI agenda.

VI. CONCLUSIONS

The purpose of this study was to examine the impact and sustainability of the National Catholic Health Service quality improvement program implemented to reduce under-5 mortality rates in Ghana. In the nine hospitals studied, the QI initiative made a remarkable impact in reducing under-5 mortality during the implementation stage. However, most of the hospitals could not sustain their improvements during the post-implementation stage. The possible reason appears to be the wrong perception held by the majority of the hospitals that the QI initiative has come to an end when the implementation period ended. This was because the QI Model used by the NCHS (Model for Improvement) appear not to include a sustainability element. The implementation stage of the model was characterized by intense monitoring and supervision by the NCHS. However, the monitoring and supervision ceased when the implementation stage came to an end. As a result, the majority of the hospitals relaxed and could not stand on their own to sustain performance. The practices and processes of the change initiative did not influence the culture and the operations of these hospitals well enough to make the huge improvements the new standard of providing quality of care.

Based on the conclusions the study recommends the following:

- Healthcare organizations implementing QI initiatives should also focus on continuous improvement and not only on positive impact. This is intended to make such organizations realize that QI is a journey that never ends.
- Quality improvement models selected by healthcare organizations for improvement should contain a sustainability component or should be modified to do so. For example, the desired impacts achieved can be instituted as the new standard of operation to ensure continuous improvement.
- Implementation of QI initiatives in healthcare should not only focus on units/departments directly involved in the program but the whole of the organization. In this way, all units/departments within the healthcare facility would be fine-tuned to drive continuous improvements to achieve healthcare goals.
- Leadership at the hospital level should be orientated to buy into the quality agenda to ensure management commitment. This way, local leadership will continue the programme when the national support dwindles.

REFERENCES

- [1] P. Cheng, L. Nelson and K. Tang, "The Development of a model for total quality healthcare, Managing Service Quality.," An International Journal, vol. 10, no. 3, 2000.
- [2] S. Dey and S. Hariharan, "Integrated approach to healthcare quality management: a case study.," The TQM Magazine, vol. 18, no. 6, pp. 583-605, 2006.
- [3] A. Hellstrom, S. Lifvergren, S. Gustavasson and I. Gremyr, "Adopting a management innovation in a professional organisation," Business Process Management Journal, vol. 21, no. 5, pp. 1186-1203, 2015.
- [4] M. Dixon-Woods, S. McNicol and G. Martin, "Ten Challenges in improving quality in healthcare: lessons from health Foundation's Programme evaluations and literature," BMJ Quality & Safety, 2012.
- [5] M. Chassin and J. Loeb, "The Ongoing Quality Improvement Journey: Next Stop, High Reliability Health Affairs," vol. 30, no. 4, 2011.
- [6] M. Chassin, "Improving the quality of health care : what's taking so long? Health Affairs," vol. 32, no. 10, pp. 1761-1765, 2013.
- [7] Anderson, "Quality Improvement in Health care: Experience from a Swedish Country Council Initiative.," PhD Linkoping University , Department of Management and Engineering, Quality Technology and Management., 2013.
- [8] A. Offei, K. Sagoe and E. Owusu-Acheaw, "Health Care Quality Assurance Manual for a Region-led. Institution-based Assurance Programme Training Manual," Ghana Health Service, Combent Impression Ltd, Accra, Accra, 1995.
- [9] Bouzid, Maha & Cumming, Oliver & Hunter and Paul, "What is the impact of water sanitation and hygiene in healthcare facilities on care-seeking behaviour and patient?A systematic review of the evidence from low-income and middle-income.," BMJ Global Health, 2018.
- [10] N. Tweneboa, C. Bannerman, A. Offei and S. Acqua, "Health Care Quality Assurance Manual 2nd ed. Ghana Health Service: Combent Impressions Ltd," Accra, 2005.
- [11] C. Bannerman, N. Tweneboa, S. Wumbee, S. Akufo, S. Sodzi-Tetteh, E. Asiedu and E. Kanyoke, " Quality and Patient Safety in Health Care, Ghana Health Service," 2013.
- [12] J. Pichert, G. Hickson and I. Moore, "Using patient complaints to promote patient safety," In Advances in Patient Safety: New Directions and Alternative Approaches, vol. 2 Culture and Redesign, 2008.
- [13] Commonwealth health, " Common health issues and progress in Ghana," 2015. [Online]. Available: http://www.commonwealthhealth.org/africa/ghana/current_health_issues_and_progres. [Accessed 19 October 2015].
- [14] S. Sodzi-Tetteh, N. Twum-Danso, I. Mobisson-Etu, L. Macy, I. Roessner and P. Barker, " Lessons Learned from Ghana's Project Fives Alive! A practical guide for designing and executing large-scale improvement initiatives," Cambridge, Massachusetts.: Institute for Healthcare Improvement., 2015.

- [15] Project Five Alive!, "Quality Improvement," 2015. [Online]. Available: <http://www.fivesalive.org> . [Accessed 27 October 2015].
- [16] W. Pescod, "Effective use of a common problem-solving process as an integral part of TQM," *International Journal of Health Care Quality Assurance*, vol. 7, no. 7, pp. 10-13, 1994.
- [17] IHI, "Institute for Health Improvement," 2015. [Online]. Available: <http://www.ihl.org/resources/Pages/default.aspx> . [Accessed 2015].
- [18] API, "Associates in Process Improvement's Model for Improvement," 2016. [Online]. Available: www.apiweb.org. [Accessed 26 November 2016].
- [19] A. Esain , S. Williams, S. Gakhal, L. Caley and M. Cooke, "Healthcare quality improvement – policy implications and practicalities.," *International Journal of Health Care Quality Assurance*, vol. 25, no. 7, pp. 565-581, 2012.
- [20] R. Boaden, G. Harvey, C. Moxham and N. Proudlove, "Quality improvement: theory and practice in healthcare. NHS Institute for Innovation and Improvement.," 2008.
- [21] U. S. Department of Health and Human Services, "Quality Improvement.Health Resources and Services Administration," 2011.
- [22] G. Langley , R. Moen , K. Nolan , T. Nolan , C. Norman and L. Provost , "The Improvement Guide: A Practical Approach to Enhancing Organizational Performance," 2009.
- [23] W. Deming, , "Out of the crisis," MIT Press, 1986.
- [24] B. Dale, *Managing Quality*, 4th, Ed., Oxford: Blackwell., 2003.
- [25] J. Coury, J. Schneider, J. Rivelli, A. Petrik, E. Seibel, B. D'Agostini, S. Taplin, B. Green and G. Coronado, "Applying the Plan-Do-Study-Act (PDSA) approach to a large pragmatic study involving safety net clinics," *BMC health services research*, vol. 17, no. 1, p. 411, 2017.
- [26] M. Antwi and M. Kale, "Change Management in Healthcare: Literature Review.," *Monieson Centre for Business Research in Healthcare*, 2014.
- [27] J. Sutherland and R. Crump, "Exploring alternative level care (ALC) and the role of funding policies: an evolving evidence base for Canada," *Canadian Health Services Research Foundation*, 2012.
- [28] C. Infoway, "A Framework and Toolkit for Managing eHealth Change: People and Processes.," *Canada Health Infoway.*, 2013.
- [29] C. Lukas, S. Holmes, A. Cohen, J. Restuccia, L. Cramer, M. Shwartz and . M. Charns, "Transformational change in health care systems: an organizational model," *Health care management review*, vol. 32, no. 4, pp. 309-320, 2007.
- [30] R. Al-Abri and G. Dickson, "Managing Change in Healthcare.," *Oman medical journal.*, vol. 22, no. 3, p. 9, 2007.
- [31] R. Kent, "Installing Change," 2001.
- [32] M. Bozak, "Using Lewin's force field analysis in implementing a nursing information system," *Computers, Informatics, Nursing*, vol. 21, no. 2, pp. 80-85, 2003.
- [33] B. Burnes, "Kurt Lewin and the Planned Approach to Change: A Re-appraisal," *Journal of Management Studies*, vol. 41, no. 6, 2004.
- [34] A. Kritsonis, "Comparison of Change Theories," *International Journal of Management, Business and Administration*, p. 8, 2005.
- [35] J. Kaminski, "Theory applied to informatics-Lewin's change theory," *Canadian Journal of Nursing Informatics*, vol. 6, no. 1, 2011.
- [36] H. Kaplan, P. Brady, M. Dritz, D. Hooper, W. Linam, C. Froehle and P. Margolis, " The influence of context on quality improvement success in health care: a systematic review of the literature.," *The Milbank quarterly*, vol. 88, no. 4, pp. 500-559, 2010.

- [37] S. Brennan, M. Bosch, H. Buchan and S. Green, "Measuring organizational and individual factors thought to influence the success of quality improvement in primary and individual factors thought to influence the success of quality improvement in primary," 2012.
- [38] J. Dahlgaard and S. Dahlgaard-Park, "Lean production, six sigma quality TQM and company culture," The TQM Magazine, vol. 18, no. 3, pp. 263-281, 2006.
- [39] J. Dahlgaard, J. Pettersen and S. Dahlgaard-Park, "Quality and lean healthcare: a system for assessing and improving the health of healthcare organisations," The TQM Magazine, vol. 22, no. 6, pp. 673-689, 2011.
- [40] D. Mboya, C. Mshana, F. Kessy, S. Alba, C. Lengeler, S. Renggli, B. Vander Plaetse, M. Mohamed and A. Schulze, "Embedding systematic quality assessments in supportive supervision at primary healthcare level: application of an electronic Tool to Improve Quality of Healthcare in Tanzania," BMC health services research, vol. 16, no. 1, p. 578, 2016.
- [41] R. Hughes, "Tools and strategies for quality improvement and patient safety. In Patient safety and quality: An evidence-based handbook for nurses," Agency for Healthcare Research and Quality (US), 2008.
- [42] K. Walshe and N. Offen, "A very public failure: lessons for quality improvement in healthcare organisations from the Bristol Royal Infirmary," Quality in Health Care, vol. 10, no. 6, pp. 250-256, 2001.
- [43] F. M. Alharbi, "The Effect of Leadership Behaviours on the Change Process in Healthcare Organisations in Saudi Arabia," Global Journal of Health Science, vol. 10, no. 77, 2018.
- [44] E. Hovlid, Q. Bukve, K. Haug, A. Aslaksen and C. von Plessen, "Sustainability of healthcare improvement: what can we learn from learning theory?," BMC health services research, vol. 12, no. 1, p. 235, 2012.

APPENDIX

Appendix 1: 2008 Under-5 Mortality Rate for Nine Hospitals

Name of Facilities	LIVE BIRTH	ADMISSIONS <5	DEATHS <5	ADM+LB	U5MR
Catholic Hospital, Battor	1,402	1206	65	2608	24.92
St. Francis Xavier Hospital, Assin Foso	2,150	1933	61	4083	14.94
Our Lady of Grace Hospital, Breman Asikuma	1,409	1334	83	2743	30.26
Margaret Marquart Cath. Hospital, Kpando	1,269	809	34	2078	16.36
Holy Family Hospital, Nkawkaw	2,375	1768	79	4143	19.07
Matthias Hospital, Yeji	893	1702	79	2595	30.44
St Martin de Porres Hospital, Eikwe	1,081	3286	144	4367	32.97
Holy Family Hospital, Berekum	1,038	1758	103	2796	36.84
Holy Family Hospital, Techiman	1,206	2520	84	3726	22.54

Appendix 2: 2009 Under-5 Mortality Rate for Nine Hospitals

Name of Facilities	LIVE BIRTH	ADMISSIONS <5	DEATHS <5	ADM+LB	U5MR
Catholic Hospital, Battor	1,687	1477	80	3164	25.28
St. Francis Xavier Hospital, Assin Foso	2,578	2088	66	4666	14.14
Our Lady of Grace Hospital, Breman Asikuma	1,862	1744	68	3606	18.86
Margaret Marquart Cath. Hospital, Kpando	1,624	1304	31	2928	10.59
Holy Family Hospital, Nkawkaw	3,248	2077	84	5325	15.77
Matthias Hospital, Yeji	1,449	2049	85	3498	24.3
St Martin de Porres Hospital, Eikwe	2,162	4054	175	6216	28.15
Holy Family Hospital, Berekum	2,225	1592	97	3817	25.41
Holy Family Hospital, Techiman	4,002	2318	103	6320	16.3

Appendix3: 2010 Under-5 Mortality Rate for Nine Hospitals

Name of Facilities	LIVE BIRTH	ADMISSIONS <5	DEATHS <5	ADM+LB	U5MR
Catholic Hospital, Battor	1,384	1001	55	2385	23.06
St. Francis Xavier Hospital, Assin Foso	2,606	2357	55	4963	11.08
Our Lady of Grace Hospital, Breman Asikuma	1,626	1766	25	3392	7.37
Margaret Marquart Cath. Hospital, Kpando	2,626	777	13	3403	3.82
Holy Family Hospital, Nkawkaw	3,698	2672	22	6370	3.45
Matthias Hospital, Yeji	1,317	1038	20	2355	8.49
St Martin de Porres Hospital, Eikwe	2,284	1096	39	3380	11.54
Holy Family Hospital, Berekum	2,574	1172	19	3746	5.07
Holy Family Hospital, Techiman	4,776	514	10	5290	1.89

Appendix 4: 2011 Under-5 Mortality Rate for Nine Hospitals

Name of Facilities	LIVE BIRTH	ADMISSIONS <5	DEATHS <5	ADM+LB	U5MR
Catholic Hospital, Battor	1,904	1182	61	3086	19.77
St. Francis Xavier Hospital, Assin Foso	2,932	2379	44	5311	8.28
Our Lady of Grace Hospital, Breman Asikuma	2,133	2781	32	4914	6.51
Margaret Marquart Cath. Hospital, Kpando	1,894	1116	22	3010	7.31
Holy Family Hospital, Nkawkaw	4,250	2523	110	6773	16.24
Matthias Hospital, Yeji	1,758	2712	98	4470	21.92
St Martin de Porres Hospital, Eikwe	2,514	3411	114	5925	19.24
Holy Family Hospital, Berekum	2,934	1657	104	4591	22.65
Holy Family Hospital, Techiman	4,318	4320	183	8638	21.19

Appendix 5: 2012 Under-5 Mortality Rate for Nine Hospitals

Name of Facilities	LIVE BIRTH	ADMISSIONS <5	DEATHS <5	ADM+LB	U5MR
Catholic Hospital, Battor	2,378	1469	52	3847	13.52
St. Francis Xavier Hospital, Assin Foso	3,028	2418	43	5446	7.9
Our Lady of Grace Hospital, Breman Asikuma	2,192	3334	27	5526	4.89
Margaret Marquart Cath. Hospital, Kpando	1,920	1223	25	3143	7.95
Holy Family Hospital, Nkawkaw	4,230	2601	111	6831	16.25
Matthias Hospital, Yeji	2,040	4560	76	6600	11.52
St Martin de Porres Hospital, Eikwe	3,165	3221	122	6386	19.1
Holy Family Hospital, Berekum	3,098	1772	76	4870	15.61
Holy Family Hospital, Techiman	5,582	4548	216	10130	21.32

Appendix 6: 2013 Under-5 Mortality Rate for Nine Hospitals

Name of Facilities	LIVE BIRTH	ADMISSIONS <5	DEATHS <5	ADM+LB	U5MR
Catholic Hospital, Battor	2,397	1614	48	4011	11.97
St. Francis Xavier Hospital, Assin Foso	2,868	2846	44	5714	7.7
Our Lady of Grace Hospital, Breman Asikuma	1,998	3250	35	5248	6.67
Margaret Marquart Cath. Hospital, Kpando	1,978	1532	21	3510	5.98
Holy Family Hospital, Nkawkaw	3,798	2574	119	6372	18.68
Matthias Hospital, Yeji	2,098	4663	87	6761	12.87
St Martin de Porres Hospital, Eikwe	3,048	3396	159	6444	24.67
Holy Family Hospital, Berekum	3,099	1997	63	5096	12.36
Holy Family Hospital, Techiman	5,667	6079	260	11746	22.14

Appendix 7: 2014 Under-5 Mortality Rate for Nine Hospitals

Name of Facilities	LIVE BIRTH	ADMISSIONS <5	DEATHS <5	ADM+LB	U5MR
Catholic Hospital, Battor	2,219	1904	51	4132	12.37
St. Francis Xavier Hospital, Assin Foso	2,976	3497	27	6473	4.17
Our Lady of Grace Hospital, Breman Asikuma	1,957	1968	20	3925	5.1
Margaret Marquart Cath. Hospital, Kpando	1,886	1687	43	3573	12.03
Holy Family Hospital, Nkawkaw	3,975	2689	107	6664	16.06
Matthias Hospital, Yeji	2,183	4893	92	7076	13
St Martin de Porres Hospital, Eikwe	3,091	3603	148	6694	22.11
Holy Family Hospital, Berekum	2,865	1654	50	4519	11.06
Holy Family Hospital, Techiman	5,283	4965	259	10248	25.27

Appendix 8: 2015 Under-5 Mortality Rate for Nine Hospitals

Name of Facilities	LIVE BIRTH	ADMISSIONS <5	DEATHS <5	ADM+LB	U5MR
Catholic Hospital, Battor	2,164	1554	60	3718	16.14
St. Francis Xavier Hospital, Assin Foso	2,911	3149	58	6060	9.57
Our Lady of Grace Hospital, Breman Asikuma	1,963	1708	20	3671	5.45
Margaret Marquart Cath. Hospital, Kpando	1,758	1854	49	3612	13.57
Holy Family Hospital, Nkawkaw	3,334	2126	79	5460	14.47
Matthias Hospital, Yeji	1,944	5092	114	7036	16.2
St Martin de Porres Hospital, Eikwe	2,915	3099	140	6014	23.28
Holy Family Hospital, Berekum	2,588	1622	56	4210	13.3
Holy Family Hospital, Techiman	5,176	4513	196	9689	20.23