Contributing Factors to Implementation of Quality Improvement Methods for Maternal, Neonatal and Child Health Services in Lower-Middle Income Countries, Using Ghana as a Case Study.

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A thesis submitted in partial fulfilment of the requirement for the degree of

Master of Public Health

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Ghana

Declaration:

Where other people's work has been used (either from a printed source, internet or any other source) this has been carefully acknowledged and referenced in accordance with departmental requirements.

The thesis **"Contributing Factors to Implementation of Quality Improvement Methods for Maternal, Neonatal and Child Health Services in Lower-Middle Income Countries, Using Ghana as a Case Study"** is my own work.

Signature: 

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Abbreviations and Acronyms

AHRQ	Agency for Healthcare Research and Quality
AIDS	Acquired Immunodeficiency Disease Syndrome
ANC	Ante Natal Care
BMGF	Bill and Melinda Gates Foundation
BPR	Business Process Re-engineering
BSC	Breakthrough Series Collaborative
CFIR	Consolidated Framework for Implementation Research
CHAG	Christian Health Association of Ghana
CHO	Community Health Officers
CHPS	Community Based Health Planning Services
CHV	Community Health Volunteer
COPE	Client-oriented Provider-efficient Services
CQI	Continuous Quality Improvement
CRS	Catholic Relief Service
DALY	Disability Adjusted Life Years
DANIDA	Danish International Development Agency
DHMT	District Health Management Team
FDA	Food and Drugs Authority
GDP	Gross Domestic Product
GGE	General Government Expenditure
GGHE	General Government Health Expenditure
GHS	Ghana Health Service
GNI	Gross National Income
HDI	Human Development Index

HIC	High Income Country
HIV	Human Immunodeficiency Virus
ICN	Improvement Collaborative Network
IGF	Internally Generated Funds
IHI	Institute for Healthcare Improvement
IMCI	Integrated Management of Childhood Illnesses
IOM	Institute of Medicine
JICA	Japanese International Cooperation Agency
LMIC	Lower Middle Income Country
MaNHEP	Maternal and New-born Health in Ethiopia Partnership
MDC	Medical and Dental Council
MDG	Millennium Development Goal
MFI	Model for Improvement
MMR	Maternal Mortality Rate
MNCH	Maternal Neonatal and Child Health
MOH	Ministry of Health
NCHS	National Catholic Health Service
NGO	Non-Governmental Organisation
NHA	National Health Accounts
NHIA	National Health Insurance Authority
NHIL	National Health Insurance Levy
NHQS	National Healthcare Quality Strategy
NMC	Nurses and Midwives Council
NMR	Neonatal Mortality Rate
OOP	Out of Pocket Payments

PC	Pharmacy Council
PDCA	Plan Do Check Act
PDSA	Plan Do Study Act
PFA	Project Five Alive
PMTCT	Prevention of Mother To Child Transmission
PNC	Post Natal Care
QI	Quality Improvement
QIC	Quality Improvement Collaborative
QoC	Quality of Care
RCT	Randomised Control Trial
RHMT	Regional Health Management Team
SPC	Statistical Process Control
TBA	Traditional Birth Attendant
TH	Teaching Hospitals
THE	Total Health Expenditure
TQM	Total Quality Management
UK	United Kingdom
UNDP	United Nations Development Programme
UNICEF	United Nations International Children Emergency Fund
USA	United States of America
USAID	United States Agency For International Development
VAT	Value Added Tax
WHO	World Health Organisation

Abstract

Quality Improvement (QI) in health is the continuous effort to improving population health through the application of tools such as Plan Do Study Act (PDSA) to iteratively generate and test change ideas to produce evidence. Since its spread from High Income Countries to Lower Middle Income Countries (LMIC), several countries have experimented with QI in their health systems, particularly for Maternal, Neonatal and Child Health (MNCH), including Ghana's QI initiative by Project Five Alive (PFA). Additionally, little evidence exists on sustainable implementation of QI, though recognised as a viable strategy to improving MNCH in Ghana and other LMIC.

The objective of this study sought to review the common QI methods used in health care and explore the determinants (facilitators, inhibitors and sustainability) influencing QI implementation for MNCH in LMIC using Ghana's experience in QI as a case study in order to make recommendations to relevant stakeholders in QI and other LMIC who want to adopt or improve QI intervention in their health systems.

A qualitative exploratory design and a systematised and desk review aided by the Consolidated Framework for Implementation Research (CFIR) and the author's field experience were used.

Five QI approaches were identified and the collaborative type was the commonest used in LMIC for MNCH. QI can be measured by structure, process and outcome. Cross cutting issues such external policy environment, leadership commitment and resource availability influenced QI implementation.

Recommendations such as improvement in the policy environment, advocacy for resources and further sustainability research in LMIC is proposed.

Key words: Quality Improvement, Contributing factors**,** Ghana, LMIC, MNCH

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Introduction

I have been a medical superintendent in-charge of a district hospital in the Ghana Health Service for almost a decade. My responsibilities among others has been to ensuring the provision of quality healthcare to clients seeking care in the hospital and implementing national healthcare policies. In my experience, I have realised that the provision of Quality of Care (QoC) at the primary healthcare level has always been a challenge in Ghana. Underlying causes of structural (infrastructure and human resources), process (attitude of health workers) have been implicated, leading to poor outcomes and high burden of disease.

Ghana's Quality Improvement (QI) Journey began in the mid 1990's with pilot projects which focused on the process of quality of care. Later, it scaled up nationwide; with the wide spread training of health workers on QI and the use of client satisfaction surveys tools as a means of measuring the process of providing quality care to clients. A Quality Assurance (QA) department was subsequently created at the Ghana Health Service to coordinate QoC activities. Consequently, several protocols, standards, guidelines and a patient charter were developed in the mid 2000's. Sequel to that, other development partners have tried implementing QA and QI projects. One such project was the Project Five Alive QI intervention which was a partnership between GHS, National Catholic Health Service (NCHS) and the Institute for Healthcare Improvement (IHI) in the United States of America (USA) and funded by Bill and Melinda Gates Foundation (BMGF). Its objective was to scale up nationwide, the Maternal, Neonatal and Child Health (MNCH) policy, which was at different stages of implementation(1). The hospital that I headed took part in this project and I appreciated the important contribution it made to QoC for MNCH in the primary health care settings of Ghana. Regrettably, the momentum to sustain the gains has waned after the project lifecycle. Currently, Ghana has developed a National Health Quality Strategy (NHQS) 2017-2021 which seeks to "*Develop a coordinated healthcare quality system in the areas of quality planning, quality control and quality improvement including improved use of data for evidence based decision making"* (1). Similar QI interventions have also been experimented in other Lower Middle Income Countries (LMIC) with sustainability challenges.

Meanwhile QoC remains a global public health concern due to its unpredictability in achieving health outcomes and the wide variations in standards within and between health systems. As a result, QoC is a common denominator in almost every global health intervention such as the Sustainable Development Goal three, World Health Organisations (WHO) health systems framework, Universal Health Coverage (UHC) and the Every New-born Every Mother strategies. Undoubtedly, QoC permeates every aspect of the global health agenda as a means to achieving health goals. Moreover, QI has been recognised as a viable strategy to make a difference in the quest to achieving UHC, particularly, for (LMIC), where resource allocation to health remains a mirage(2–4).

Therefore, this study seeks to draw from the experiences of implementing QI intervention for MNCH in LMIC and identify the determinants influencing QI implementation in those settings, using Ghana as a case study in order to make recommendations to relevant stakeholders on QI and other LMIC who hope to adopt or improve QI interventions for their health systems, particularly for MNCH which continues to contribute substantially to the burden of disease in LMIC.

Chapter 1: Background Information

This chapter presents the context of Ghana in terms of geographical location, key demographic, socioeconomic, governance and health system indicators in order to have a better understanding of the setting of this study.

1.1 Geography and Demography

Ghana shares boundaries with Ivory Coast on the west, Togo to the east, Burkina Faso to the north and the Gulf of Guinea to the south. It is located on the coast of West Africa with a total surface area of 239,460 square kilometres and a population density of 103 people per square kilometre in 2010 from 79 people per square kilometre in 2000(5).

The 2010 Population and Housing Census (PHC), puts Ghana's population at 24.6 million with an annual growth rate of 2.5%, a decrease from 2.7% in 2000, the population of Ghana is estimated at 28.9 million in 2017. Females are 51.2% while males constitute 48.8%. Ghana is rapidly becoming more urbanized with 50.9% and 49.1% of its population living in urban and rural areas respectively in 2010 compared to 43.8% and 56.2% in 2000. The population structure shows a youthful tilt with 38% below 15 years, 55% between 15-59 years and 11% above 59 years. Literacy rate is 74.1% with major male/female differences (80.2% and 58.5% respectively); 71.2% are Christians, 17.6% are Muslims and the rest belong to traditional religion or have no religious affiliation(5).

1.2 Socioeconomic and Politics

Ghana belongs to the class of LMIC with a Gross National Income (GNI) per capita of $1,380 and a Gross Domestic Product (GDP) of $42.69 billion dollars and an annual GDP growth rate of 6.60% as at 2016 (6). Ghana's Human Development Index (HDI), according to United Nations Development Programme (UNDP) is 0.579 and ranked 139th in the world in 2016(7). Agriculture remains the biggest occupation, employing more than half of the population, mainly involved in crop farming, livestock rearing and fishing. The country relies on the export of cocoa, gold, timber, bauxite, manganese, diamond and crude oil to raise revenue and about 28% of the population lives below the poverty line of $1.25 per day(8).

Ghana is a unitary republic with multi-party, unicameral parliamentary system of government with an executive president. Ghana is seen as a model of democracy in Africa with peaceful transfer of power from one government to the next since the promulgation of the 1992 constitution(9).

1.3 Health System Context

1.3.1 Organisational Structure of the Health System

The Ministry of Health (MOH) is at the apex of the health system and responsible for policy making and regulation. To fulfil its mandate, it has several agencies working beneath it. The

GHS is the biggest implementing agency and provides about 60% of health service delivery. The remainder is provided by the Teaching Hospitals (TH), Christian Health Association of Ghana (CHAG) and the private sector. Other notable agencies include; Medical and Dental Council (MDC), the Nurses and Midwifery Council (NMC), Pharmacy Council (PC), Private Hospitals and Maternity Homes Board, Food and Drugs Authority (FDA) and the National Health Insurance Authority (NHIA)(10).

1.3.2 Health Financing

Ghana has a social health insurance scheme which is managed by the NHIA and was established under the National Health Insurance Act 2003, Act 650 to provide financial risk protection against the cost of quality basic health care for all residents in Ghana. The two main sources of funding the scheme are from 2.5% contribution of the social security of employees in the formal sector and 2.5% National Health Insurance Levy (NHIL) from the Value Added Tax (VAT), collected on goods and services, constituting 90% of funding. The number of active members on the scheme increased slightly from 9.8 million (37% of total population) in 2013 to 10.3 million (38% of total population) in 2014. Two thirds of these are exempt and do not pay premiums coupled with stagnated premiums, making the scheme not sustainable, with delays in reimbursements negatively affecting quality healthcare delivery due to lack of supplies to run facilities. Pregnant women and children under 18 years are among the exempt groups(11). According to the latest (2014) National Health Accounts (NHA) figures, Total Health Expenditure (THE) as a percentage of GDP was 3.6% a decrease from 4.6% in 2013 and departure from the recommended at least 5%. While the external support as a percentage of THE increased from 8.6% in 2013 to 15.4% in 2014, the General Government Health Expenditure (GGHE) as a percentage of General Government Expenditure (GGE) decreased by almost half, from 10.6% in 2013 to 6.8% in 2014 shy of the Abuja declaration commitment, signed by the Ghanaian government of 15%. Out of Pocket payments (OOPs) as a percentage of THE inched up from 19.9% to 26.8%, risking financial catastrophe for many households, while total expenditure per capita reduced from $84.5 in 2013 to $57.9 in 2014(12). These worrisome health financing figures certainly have implications for quality health care delivery in Ghana.

1.3.3 Human Resource for Health

With the continuous training of human resources and implementation of retention policies in the form of improved remuneration, the tide of brain drain has waned and Ghana is witnessing a gradual improvement of its human resource for health. In 2014 the doctor to patient ratio improved from one doctor to 10,170 persons in 2013 to one doctor to 9,043 persons. The nurse and midwifes situation has also improved with one nurse to less than 1000 persons and one midwife to less than 175 deliveries per year respectively, actually exceeding the WHO standards. There is however inequitable urban/rural distribution in favour of urban areas with implications and consequence on quality of health care delivery which needs to be tackled(11).

1.3.4 Health Status

The life expectancy from birth in Ghana has been improving since the 1990's attributed to improving economy and health system and as at 2015 is estimated at 63.1 for male and 67.6 for females. Top five causes of death are lower respiratory tract infections, stroke, ischemic heart disease, malaria and HIV/AIDS, indicative of the double burden phenomenon. Causes of Disability Adjusted Life Years (DALYs) are mainly communicable, maternal, neonatal and nutritional diseases(13).

1.3.5 Child and Maternal Health

Ghana has witnessed improvement in the overall survival rate in the past ten years for children amidst disparities. Per the Demographic and Health Survey, under-five mortality has reduced by 25% from 80 to 60 deaths per 1000 live births from 2008 to 2014 respectively, infant mortality by 18% from 50 to 41 deaths per 1000 live births and neonatal mortality by 3% from 30 to 29 deaths per 1000 lives birth within the same period(14). Notwithstanding these achievements, Ghana's progress was slow and missed the MDG targets for under five mortality(15).

At 319 deaths per 100,000 live births, Maternal Mortality Ratio (MMR) saw a 32% reduction from 2000. However this decline was not enough to reach the MDG target of 185 deaths per 100,000 live births(14).

Curiously, recommended four Antenatal Care (ANC) visits and institutional deliveries coverage have reached 87% and 74% respectively with no impact on MMR and Neonatal Mortality Rate (NMR). Currently NMR accounts for almost half of all under-five deaths in Ghana. The underlying cause of these mortalities is attributed to both demand and supply side factors such as poor healthcare quality in the health facilities associated with lack of essential health supplies such as medicines and equipment, inequitable skilled staffs' distribution, poor staffs' attitude among others. Poverty, low education and socioeconomic status are some contributory demand side factors(11,16).

In response, the MOH in July 2014 launched the National New-born Health Strategy and Action Plan 2014-2018 to accelerate the reduction of under-five mortality. The plan seeks to reduce NMR from 29 deaths per 1000 live births in 2014 to 21 deaths per 1000 live births in 2018(14,16).

Chapter 2: Problem Statement, Justification, Objectives and Methodology

This chapter outlines the problem and justifies the study. The objectives are stated and the method used to achieve them is described, including the conceptual framework used for literature search, analysis and synthesis of the findings.

2.1 Problem Statement

Despite the spread of QI approaches, particularly the collaborative improvement types to LMIC from HIC, through the efforts of international Organisation's(17–19), limited evidence exists to support the notion of their success in a sustainable manner, for MNCH services(18,20). This is supported by a review in 2011 by Raven et al.(21) which echoed the dearth of research about contributory factors to the success and or failure of QI approaches in the delivery of MNCH services in LMIC.

MNCH service delivery remains a major challenge for LMIC and QI approaches have been recognized worldwide as potential priority interventions to contribute in improving health outcomes for MNCH(22). This was given further impetus by the WHO, who in their 2007 framework, acknowledged the important role of QI in MNCH(2)**.**

Notably, most studies that have shown the success of QI methods were done in limited settings of hospitals(21,23,24) and primary health centres as projects(25,26), with little evidence of their institutionalization into the health systems of LMIC after projects' life cycle. Even in HIC, where QI approaches, especially the collaborative type have been used for over two decades, there is still limited understanding about their effectiveness and sustainability, hence the need for further studies in HIC(27).

In terms of what is known from the literature, several studies have suggested determinants for successful QI implementation and sustainability. However most of them were done in HIC settings(27–31). Davis et al.(28) sums these into four main groups, which are: *(1) public health leadership support for QI and an empowered staff to innovate; (2) building capacity of individuals and teams to practice QI activities; (3)establishing national networks and resources for QI activities; and (4) providing finances and incentives for QI implementation*. (28). However in the context of LMIC, it is uncertain whether similar or other determinants apply.

Meanwhile, successful and sustainable QI interventions rely on the diffusion (passive spread of innovation) and dissemination (active spread of innovation) of best practices(32). Review evidence from HIC suggest similar factors contributing to the diffusion and dissemination of best practices and change ideas as outlined by Davis et al.(28) above (33,34). However, the effectiveness of dissemination of best practices and change ideas in collaborative learning sessions is argued to be uncertain according to some studies in HIC due to the difficulty in measuring them(33,35). Particularly, enabling factors such as leadership, QI team dynamics,

change agents and champions' enthusiasm and use of data, acting in concert with the particular change idea, are said to be crucial in the dissemination of innovations(32).

As discussed above, most of the QI interventions in LMIC are driven and funded by international organisations as projects with a limited life span and sustaining and institutionalising them after the lifecycle, into the health systems, remains a challenge(36). Paradoxically, these QI interventions always have, as one of their goals, to integrate interventions into the health systems of beneficiary countries. However the evidence shows the contrary(37). Conversely some studies in HIC such as USA have shown that it is possible to sustain QI gains after project lifecycle with the right conditions. For instance Bray et al. 2009(37) argued that leadership commitment, availability of resources, strategic partnership with critical stakeholders, advocacy and meeting regularly to review progress, were important measures to ensuring sustainability of QI interventions(37). Again, it is uncertain how this pans out, in the LMIC context. Therefore, there is the need for further studies in the context of LMIC to understand the intricacies and challenges of QI implementation and possibly identify the determinants of successful approaches that can be embedded in the health systems of LMIC(38).

2.2 Justification

Considering the above preliminary review of evidence, it can be gleaned that QI is an evolving area of global interest and sustaining and institutionalising them into the health systems of LMIC remains a major challenge(20,39). Recognizing this, Bradley et al. 2012(19), admonished for further research to develop context specific QI interventions that can be successful and sustainable in order to exploit the potential that QI interventions have in contributing to MNCH service delivery in LMIC settings(19). This study seeks to do just that.

Ghana's nationwide QI project has been considered a model of successful and sustainable intervention for a rapid and phased national scale up of a MNCH program in LMIC settings(40,41). Therefore it will be worthwhile to review the determinants for its successful implementation and compare that with other, similar projects in the context of LMIC in order to understand the contributory factors, underpinning QI implementation in LMIC.

The focus of this review will be on the Institute of Healthcare Improvement (IHI) Model for Improvement (MFI) and collaborative QI approaches used in Ghana by PFA to test and scale up a national MNCH policy. This will allow for comparison with other LMIC who used similar approaches in order to contribute to the discourse on QI implementation and lessons elicited in this review could be adopted by LMIC seeking to implement QI methods for MNCH in their health system.

2.3 General Objectives

To explore the factors contributing to the implementation of QI methods on MNCH in LMIC, using Ghana as a case study, in order to make recommendations to relevant stakeholders for

improved QI adoption for MNCH programming and management in Ghana as well as countries of similar context.

2.3.1 Specific Objectives

2.3.1.1 Review the common QI methods used in healthcare and evaluations regarding their implementation in both LMIC and HIC.

2.3.1.2 Explore the facilitating factors contributing to QI methods implementation on MNCH in Ghana and other LMIC.

2.3.1.3 Explore the inhibiting factors contributing to QI methods implementation on MNCH in Ghana and other LMIC.

2.3.1.4 Explore the factors that contribute to the sustainability of QI methods implementation after program life cycles in Ghana and other LMIC.

2.3.1.5 Make recommendations for QI method implementation in Ghana and other LMIC.

2.4 Methodology

This is a qualitative, exploratory study. Systematized review and desk study were used to search for and identify relevant peer reviewed and grey literature on QI approaches used in improving MNCH in LMIC settings, in order to achieve the objectives of the study. According to Grant and Booth 2009(42), systematized reviews contain some elements of a systematic review and are typically used for postgraduate studies dissertation. Their strength is that they allow the author to systematically and comprehensively search the literature for information and demonstrate awareness and technical knowledge of the steps of the process. However, their review falls short of the comprehensiveness of the systematic review in assessing quality of studies and prone to bias(42)

2.4.1 Data Bases

The following electronic data bases and web site were used to search – Google Scholar, PubMed, VU library, Agency for Healthcare Research and Quality (AHRQ), IHI, USAID, World Health Organization (WHO), the United Nations International Children's Emergency Fund (UNICEF), the World Bank, and MOH. The search was done between June and August 2017.

2.4.2 Search Terms

MeSH and non-MeSH search terms were used in combination with their various synonyms and geographical locations using Boolean operatives [AND], [NOT] and [OR]. Details are found in the **table 1** below.

Table 1 Search Terms

Key Words	Implementation AND	Quality Improvement AND	Methods AND	Maternal Neonatal	Determinants AND	Lower Middle

				Child Health AND		Income Country AND
Synonyms/Combined words	OR Interventions OR Applications OR Execution OR Practice OR Use	OR "Quality improvement collaborative" OR "Breakthrough collaborative series" OR "Total quality management" OR "Continuous quality management" OR "Quality of care" OR "Quality of healthcare" OR "Quality healthcare" OR "Continuous quality improvement" OR "Model for Improvement" OR "Plan do study act" OR "Plan do study check" OR "Quality	OR Tools OR Types OR Approaches OR Strategies OR Typology OR Methodologies	OR "Women health" OR "Infants health" OR "Perinatal health" OR "Antenatal health" OR "Postnatal health" OR "Intra-partum health" OR "Delivery care" OR "Safe motherhood" OR Motherhood OR Pregnancy	OR Embeddedness OR Institutionalize OR Institutionalization OR Challenges OR "Success factors" OR Effectiveness OR "Facilitating factors" OR "Inhibiting factors" OR Barriers OR "Sustainability factors" OR "Contributory	OR "Developing countries" OR "Sub-Sahara Africa" OR "Resource-poor countries" OR "Poor countries" OR "Least developed countries" OR "Underdeveloped countries" OR "Low resource settings" OR "Low resource countries" OR "Under resource

		assurance" OR "Integrated management of childhood illnesses" OR "Integrated management of neonatal and childhood illnesses" OR "Quality improvement teams" OR "Quality improvement initiative"			Factors" OR Factors OR "Enabling factors"	settings" OR "Under resource countries"

Table 1 Key search terms and their synonyms used in search strategy

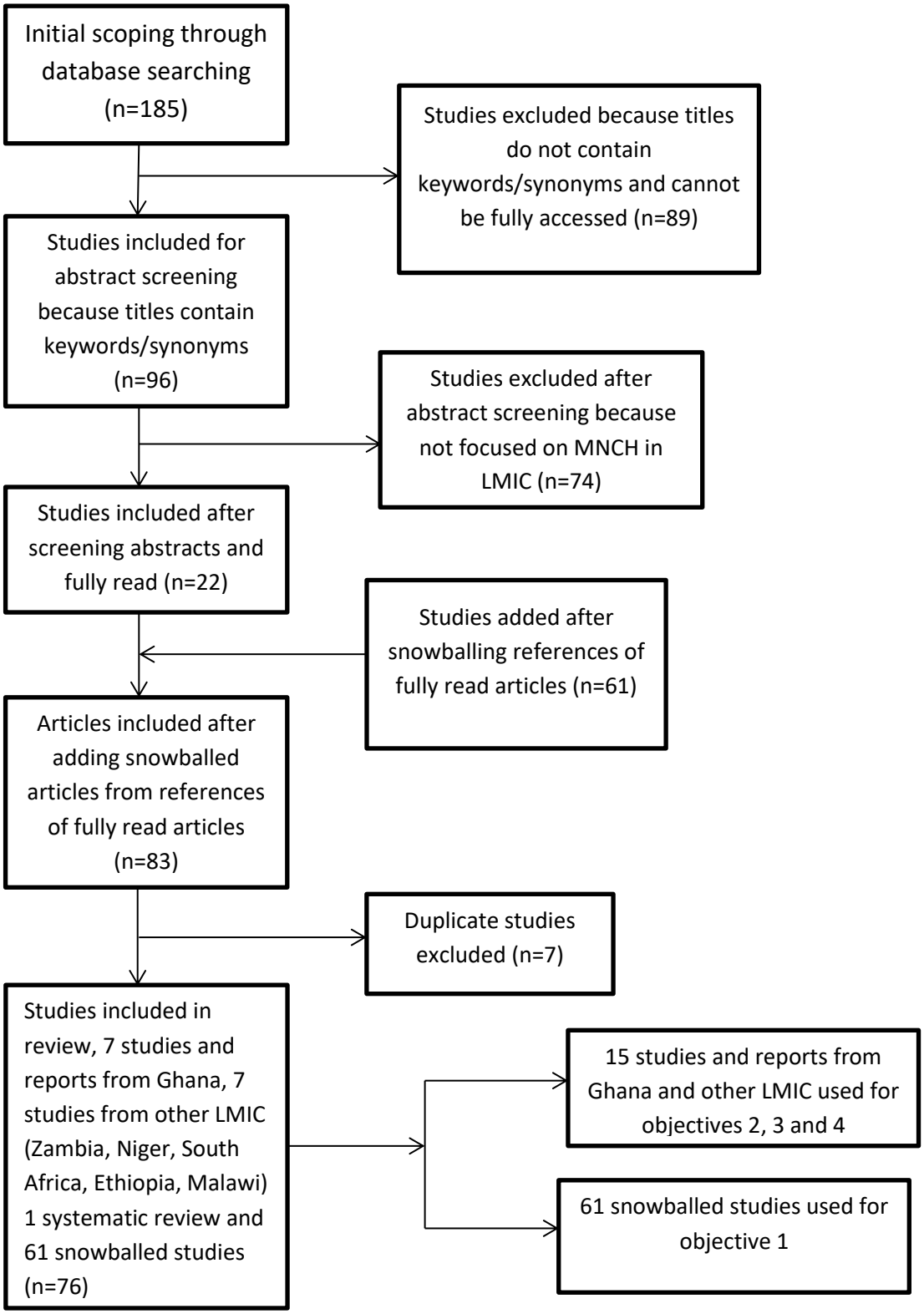
2.4.3 Inclusion and Exclusion Criteria

Articles that were included in this review were those that the author had full access to, published in English for easy understanding and focused on common QI approaches used in health, specifically focused on the collaborative types used in Ghana and other LMIC for MNCH services. The articles should also have had information on the determinants of QI implementation to be included in the review. No year restriction was imposed due to the limited number of published studies available for LMIC.

2.4.4 Search Strategy

Initial scoping yielded 185 studies which were saved and screened in stages. In the first stage, titles of the studies were read and those that did not contain the key word 'Quality Improvement' or synonyms or could not be accessed fully, were excluded. In the second stage, the abstracts' of the remainder were read and those that did not focus on MNCH and LMIC context were also excluded. In the third stage, studies that satisfied the inclusion criteria were fully read and those that did not contain information on determinants of QI implementation were also excluded. In the fourth stage, the references of the studies included at this stage were snowballed as much as possible for other relevant studies that could be added and those that satisfied the inclusion criteria were duly added. This was done for all the data bases searched as stated above and after removal of duplicates, finally, 76 studies were found to be critical for this review. See details in **figure 1** below.

Figure 1 Scheme of Search Strategy Process



2.4.5 Limitations of the Study

All the articles and reports that were found on Ghana's experience with QI were published by members of the PFA during the life cycle of the project. Therefore there is a possibility of bias of selecting what gets published to showcase the success of the project to funders and others.

Again, the use of the author's experience could introduce bias because of his involvement as a manager of one of the collaborative health facilities involved in the PFA QI project in Ghana.

There are few published studies in the context of Ghana and other LMIC on QI approach implementation. Additionally, the quality of the articles used could not be fully assessed since this is a systematized review and not a systematic one Therefore the findings of this study do not fully represent the context of LMIC and cannot be generalized. It is possible that there are unpublished studies that went undetected and could have enriched this review if they had been added.

This review's scope was limited to determinants influencing the implementation process of QI approaches in LMIC on MNCH and not necessarily the health impacts of those approaches. Impact reviews are outside the scope of this review since that is influenced by so many factors which cannot be accounted for in this study due to limitations in time and resources.

The limit to word count guided the breadth and depth of this review. As a result relevant information that could have enriched the review was left out in order to meet this requirement.

2.4.6 Conceptualised Framework

Figure 2 Conceptualised Framework

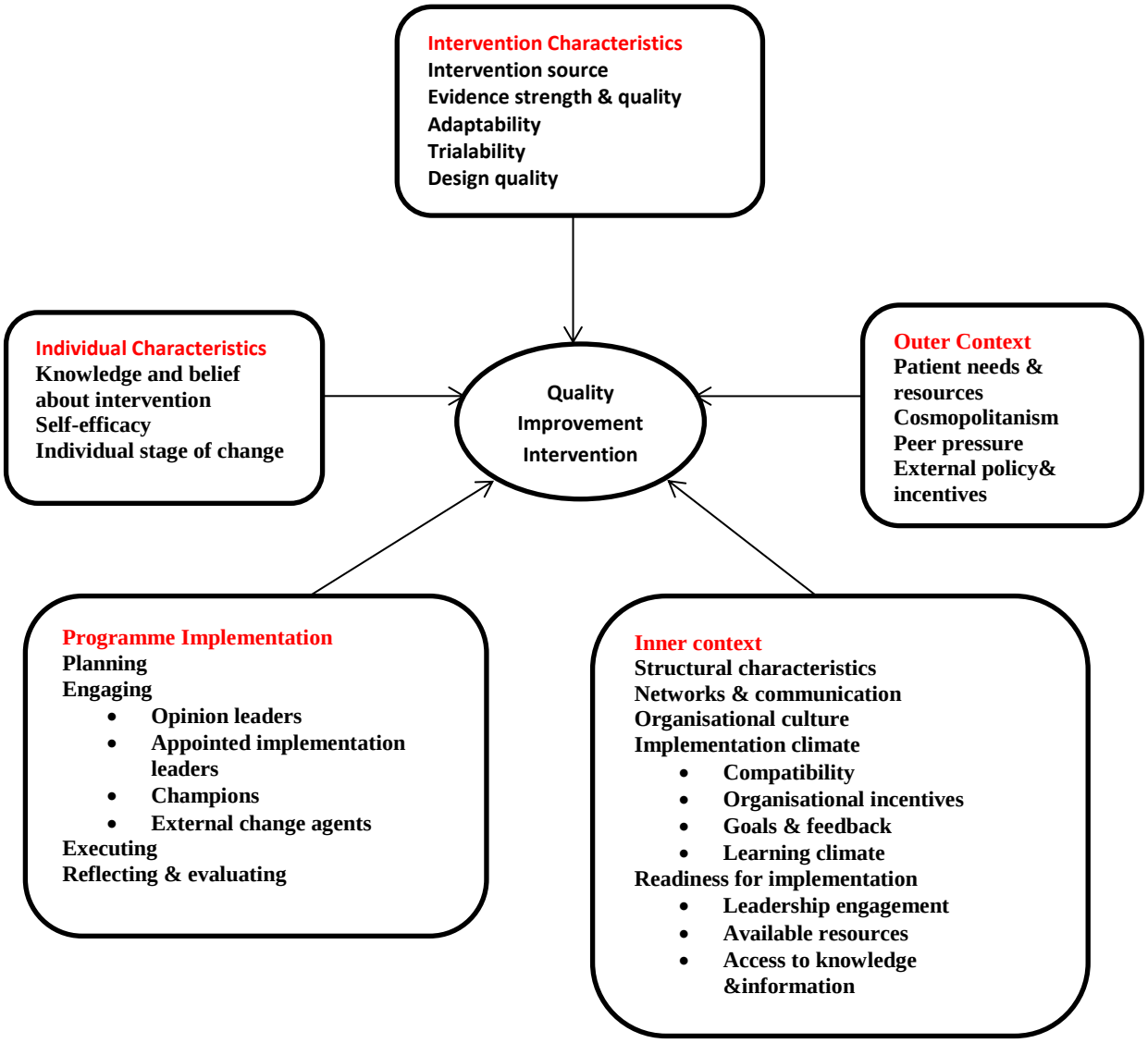


Figure 2 Consolidated Framework for Implementation Research (CFIR)(43–45)

Many a time, there exist a gap between health interventions and the effective translation of those interventions into desired client outcomes. This is because the health ecosystem is intrinsically complex with so many elements, forming intricate relationships and interactions that are often difficult to understand and predict. Further, this operates in a more complex extrinsic context with so many determinants (facilitators, inhibitors, sustainability). These acts at multiple levels such as: the client, provider and the policy levels. Therefore, it is not enough for researchers to focus evaluations of health interventions only on outcomes but to include formative evaluations to assess and understand the extent of implementation based on the context to optimize the

benefits of interventions in a sustainable manner. This will enable effective dissemination to other contexts(43).

Many implementation frameworks for evaluation of health intervention exist, with different taxonomies and overlap in several respects. Recognizing this, Damschroder et al. 2009(43) carried out a systematic review of 19 frameworks and proposed the CFIR shown in **figure 2** above, composed of five major domains: intervention characteristics, outer setting, inner setting, characteristics of the individuals involved, and the process of implementation. Each domain has a set of constructs and in all, there are 37 constructs. **See annex 1 for details of constructs and their definitions**. The CFIR is a 'meta theoretical' framework which coalesces, common constructs from existing frameworks. It serves as an 'overarching typology' with common constructs that can be used to evaluate why and how interventions work and in different contexts. It serves as a 'one stop shop' that offers researchers the opportunity to choose which constructs are applicable to their settings for diagnosing and evaluating implementation process of interventions in order to identify and explain which domains and constructs facilitate, inhibit or sustain interventions, especially, QI interventions. Apart from the flexibility of this framework, the author chose it because it can be used at any phase (pre, during and post) of the implementation process of interventions, to summarise, analyse and synthesise determinants influencing the implementation of interventions, specifically QI interventions. This makes it user friendly. However, its limitation is that, it doesn't show the apparent relationship between constructs and these relations if any exist, must be deduced from the findings of its application based on the context(43,46).

Since this review is a post implementation evaluation, it implied that the findings had to be deductively extracted from the literature. These were then summarised under appropriate thematic areas (domains and constructs) for analysis and synthesis of findings presented in the next chapter below.

Chapter 3: Findings

This chapter presents the findings of this review under each objective. It consists of two sections. The first section focuses on the definitions, history, approaches and evaluations of QI in health while the second section focuses on the determinants of QI implementation in Ghana and other LMIC viewed through the lens of the conceptual framework.

3.1 QI in Healthcare (Definitions, History, Approaches and Evaluation)

3.1.1 What is Quality of Care (QoC)?

QoC has various definitions and can be used in relation to both healthcare and health systems. In all cases, it is imperative to have a working definition for QoC in order to be able to develop and select new interventions and strategies for QI efforts(47).

The WHO defines QoC as "*the extent to which health care services provided to individuals and patient populations improve desired health outcomes. In order to achieve this, health care needs to be safe, effective, timely, efficient, equitable, and people-centred" (48p1046).* It further recognises that QoC is a multi-dimensional concept that requires a conceptual framework, identifying the domains of QoC that can be used to assess, monitor and improve healthcare within the context of health systems as the basis. Therefore it advocates for a health systems approach to QI interventions, which provides the matrix for access to quality healthcare, through the process of linking provision and experience of care(48).

Similarly, the Institute of Medicine (IOM) defined QoC as *"The degree to which health services for individuals and populations increase the likelihood of desired outcomes and are consistent with current professional knowledge"*. According to IOM, QoC should be viewed in six dimensions (Patient centeredness, equity, effectiveness, efficiency, timeliness and safety)(49,50p21). Below are the definitions of the six dimensions;

Table 2 Definitions of Dimensions of QoC

Dimension	Definition
Effective	*"Delivering health care that is adherent to an evidence base and results in improved health outcomes for individuals and communities, based on need".*
Efficient	*"Delivering health care in a manner which maximizes resource use and avoids waste".*
Accessible	*"Delivering health care that is timely, geographically reasonable, and provided in a setting where skills and resources are appropriate to medical need".*
Acceptable/patient centred	*"Delivering health care which takes into account the preferences and aspirations of individual service users and the cultures of their communities".*
Equitable	*"Delivering health care which does not vary in quality because of*

	personal characteristics such as gender, race, ethnicity, geographical location, or socioeconomic status".
Safe	*"Delivering health care which minimizes risks and harm to service users".*

Table 2 showing the six dimensions of QoC and their definitions(47,49,50p21)

In earlier views of QoC, Lee and Jones in 1933 defined it as *"The kind of medicine practiced and taught by the recognised leaders of the medical profession at a given time or period of social, cultural and professional development in a community or population group"* (51p6)

Donabedian defined QoC as ***"****The application of medical science and technology in a manner that maximizes its benefit to health without correspondingly increasing the risk"* (52,53p679). He developed a conceptual framework for evaluating QoC namely: **structure** (resources including trained personnel), **process** (interaction between providers of healthcare and their clients), and **outcome** (experiences and changes in the clients' health status) (49,52). These three components are important in measuring QoC to be discussed later; however, most literature focuses on process of care, particularly on the appropriateness of provider performance according to professional standards.

3.1.2 What is QI?

Recognising the need for a common definition of QI in public health and after reviewing the appropriate existing literature, Bialek et al. 2009(54p6) defined QI as; *"The use of a deliberate and defined improvement process, such as Plan-Do-Study-Act (PDSA), which is focused on activities that are responsive to community needs and improving population health. It refers to a continuous and on-going effort to achieve measurable improvements in the efficiency, effectiveness, performance, accountability, outcomes, and other indicators of quality in services or processes which achieve equity and improve the health of the community"* (54p6)**.**

Similarly, Tawfik et al.(55p2) also proposed a definition for QI as; *"A cyclical process of measuring a performance gap; understanding the causes of the gap; testing, planning, and implementing interventions to close the gap; studying the effects of the interventions; and planning additional corrective actions in response"*(55p2)**.**

Specific to MNCH, QI additionally covers dimensions related to sexual and reproductive health rights and equitable access to prompt and needed care. It emphasizes the quality of provision of care and the clients' experience of quality of service received(53,56)**.**

Based on the discussions above, there is a common understanding of QI being a continuous and iterative process of using evidence informed information to develop interventions aimed at improving the structures, processes and outcomes of health systems and these must be done in an effective, efficient, equitable, timely, safe manner and centred on the patient.

Hughes sums QI so succinctly as; "*Quality improvement is based on the principle that there is an opportunity for improvement in every process and on every occasion"*(41p2).

In terms of roles and responsibilities of stakeholders, policy makers are responsible for developing whole system strategies to improve performance and quality outcomes in service delivery. Healthcare providers whose responsibility it is to ensure clients' receive technically safe services and the communities who must accept the services provided should engage actively in contributing to the policy agenda setting process. Communities should be seen as partners and 'co-producers' of healthcare delivery and should be able to influence quality healthcare policies to improve their own health status. This is in tandem with what Ashraf said; *'Health isn't something that can be handed to people; it is a state that they must produce themselves by interacting with a health care system'*(57p3). This is because they are in the best position to identify their health needs better and healthcare providers must operate with an understanding of these and be responsive. It is necessary to recognize the different roles and responsibilities of the various stakeholders as stated above but more importantly, the interrelatedness should be appraised (47).

Therefore, Langley et al. suggested certain key underlying principles that should underpin QI interventions(58). These include;

- Placing patients at the centre and involving them in the co-design.
- Understanding work processes as components of a wider system and re-designing accordingly.
- Improving the reliability of the system and clinical processes
- Understanding variation and measuring the processes.
- Using data for measuring improvement.
- Recognizing and valuing the expertise of people in the frontline to promote ownership of QI interventions.
- Focusing on the design, deployment and assessment of complex multi-faceted interventions(58–60)

3.1.3 History and Pioneers of QI in Health

Modern QI in health has its origins in the US manufacturing industry as early as the 1920's as a means of controlling quality in production processes. It was later introduced to the Japanese manufacturing sector by US experts such as W Edwards Deming, Joseph Juran and Armand Feigenbaum and the Japanese expert Kaoru Ishikawa between 1940 and 1950. Subsequently, inspired by the success in the manufacturing sector, QI pioneers such Don Berwick, spread the ideas and innovations into the health sector and made significant contributions to QI in the IHI in

the US and beyond. He founded in 1991 and led the IHI for almost 2 decades to innovate and influence QI globally, developing approaches such as the MFI which have since diffused throughout both the developed and developing countries(61)**.**

Other QI pioneers such as W. Edward Demings is credited for creating the 'Plan-Do-Check-Act (PDCA)' which later became the PDSA and currently an integral part of many QI approaches in both developed and developing countries. For instance, it has been combined with the MFI developed by IHI to implement QI interventions in most parts of the world. His innovation was inspired and underpinned by his 'theory of profound knowledge' which sought to understand and explain how various elements of a system interacted. This can then be exploited for change for improvement(61). **See annex two for details of the contributions of other pioneers of QI.**

QI interventions were introduced in LMIC such as Africa in the 1990s and largely influenced by QI movements in US and UK. These were mainly introduced by International Organisations such as USAID, IHI, WHO, UNICEF and some progress in terms of applying QI interventions in LMIC have been made over the past decade, though variations exist in the performance of these interventions which calls for further attention and research(18,19,38)**.** This will be explored further subsequently in this chapter.

3.1.4 QI Approaches in Health

Powel et al.(62) identified five major approaches, with their methods and tools, that have been applied in both clinical and public health practice, in both developed and developing countries(62). They include; IHI rapid cycle change/QI collaborative, Total Quality Management/Continuous Quality Improvement (TQM/CQI), Business Process Re-engineering (BPR), Lean Thinking and Six Sigma. One of them, the IHI rapid cycle change has been discussed in the next section since it is the focus of this review. For the rest, **see annex two** for details. The terms "approaches," "methodologies," and "tools" in QI are used to describe the different ways to improve the quality of healthcare. Approaches are the philosophical basis from which methodologies and tools emanate. Methodology is the orderly well defined steps used to implement a QI approach. Tools are the instruments used to collect, analyse and interpret data on QI interventions(21). The various approaches from the literature are underpinned by two types of policy approaches; those intended to alter healthcare provider behaviour by organizational structural changes and those targeting healthcare provider behaviour at the individual and group levels(17).

3.1.4.1 IHI and Rapid Cycle Change/QI Collaborative

The rapid cycle change of the IHI uses the PDSA tool for an iterative, short cycle, small scale test of 'change ideas' to bring about continuous improvement in processes in order to achieve desired outcomes, either as a standalone method or as part of wider QI approaches(63–65). A 'change idea' is a specific idea that, if applied, may lead to an improvement. It is based on Langley's MFI which asks three questions: What are we trying to accomplish (aim)? How will we know that a change is an improvement (measure)? What changes can we make that will result

in improvement (change ideas)? (**See figure three below)**. Consequently, low-risk test of change ideas from frontline staff is carried out and based on the results, they are refined or abandoned. It allows for the generation of evidence on a small scale and building trust that the intervention can work, thereby convincing all staff to embrace and own the QI intervention(40,62,63).

In the PDSA, the PLAN involves identifying the quality problem and setting objectives for planned changes, DO entail testing of plans and documenting results, STUDY involves observing and analysing the effects of the DO and ACT involves adoption, refinement or abandoning the change idea that has been tested(62,65).

When multiple QI teams from either the same or different organisations are involved in implementing a QI intervention, using the PDSA tool in a repeated deductive (PLAN and DO)-inductive (STUDY and ACT) cycles and collaborating through sharing experiences and best practices at intervening learning-sessions, then the 'Quality Improvement Collaborative' (QIC) is being employed(44). It has various types but the commonest is the 'Breakthrough Series Collaborative' (BSC) developed by IHI in 1996 (**see figure four below**). Though collaborative methods vary in terms of what is to be improved, number of organisations involved, resource availability, types of teams and so forth, Øvretveit et al.(66) found in their research the following common characteristics that run through all of them; multi professional teams from different organisations, focused on improving quality in a specific healthcare area; evidence of gaps between current practice and best practice; teams are mentored by facilitators on QI methods and best change concepts; teams use the PDSA tool described above to go through the process of testing change ideas; teams meet for a few days for learning-sessions, experience sharing, diffusion of innovations; mentoring support for teams by facilitators. This has been used in healthcare in developed countries such as the US, UK, Netherlands and credited with some success(33,64). These innovations have also been spread to some LMIC countries such as the PFA programme on MNCH in Ghana which was evaluated to have contributed to improving MNCH indicators(40).

Figure 3 Model for Improvement

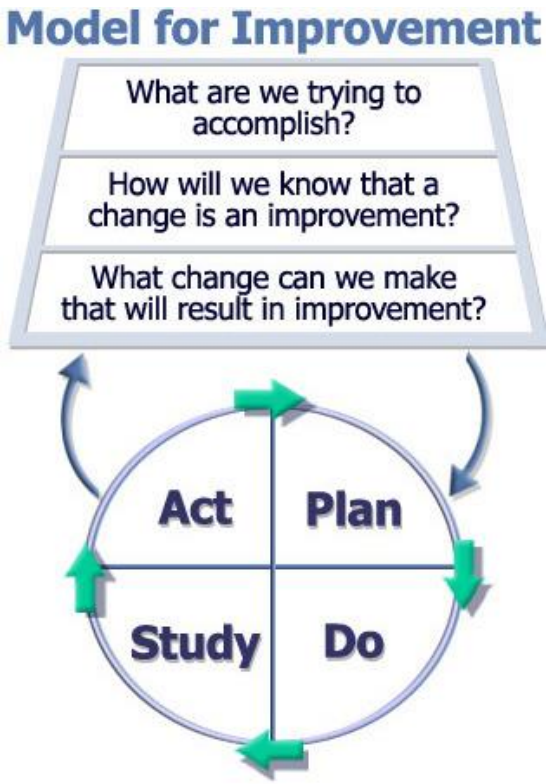


Figure three Institute for Healthcare Improvement (IHI) Model For Improvement (MFI) showing the three key questions before using the PDSA tool to test change ideas(64)

Figure 4 Collaborative Model

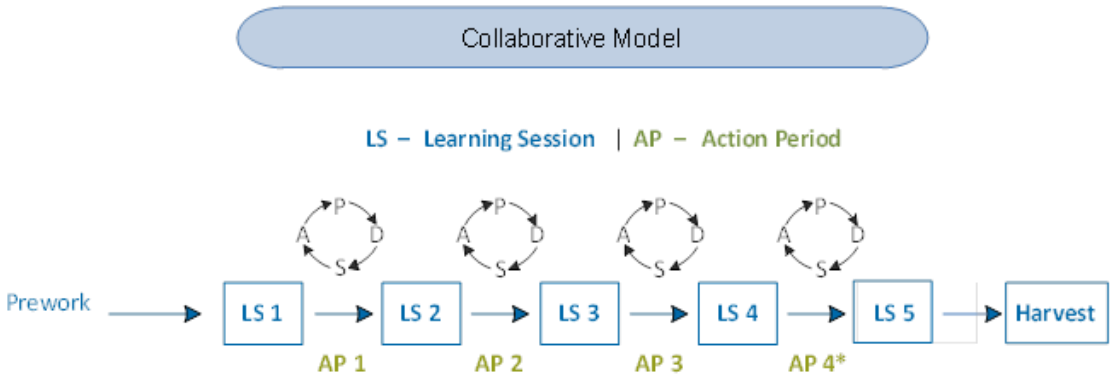


Figure four Collaborative Model showing iterative process of Learning (sharing of experiences and best practices and reinforcing QI concepts) and Action Sessions (testing of change ideas using the PDSA tool at health facilities)(64)

3.1.4.2 QI Approaches in LMIC

The diffusion of QI innovations in LMIC has been influenced greatly by international organisations such as IHI, USAID, WHO in collaboration with MOH of governments in respective LMIC, over the past two decades. Largely, most of these approaches' namely: Integrated Management of Childhood Illness (IMCI), Client-oriented Provider-efficient Services (COPE) and CQI/BSC have been based on TQM/CQI and BSC, though named differently. Ghana's example based on CQI/BSC is discussed below since it is the focus for this review. **See annex two** for details of the others.

3.1.4.2.1 QI in Ghana by PFA (CQI and BSC)

Agyepong et al. in 2001 argued for the consideration of CQI as a management philosophy and tool to improve the quality of primary healthcare in Ghana(67). Following that, GHS introduced a national policy to improve MNCH in response to achieving MDGs 4 and 5. Included in the policy were, to increase skilled care during ANC, delivery, immediate post-partum and surveillance visit within the first week of life PNC(68).

Subsequently, implementation of the policy was done using a QI methodology; through a collaboration between GHS, NCHS, IHI and funded by BMGF. The partnership became known as PFA which commenced in 2008 and ended in 2015. The roles of the partners were; GHS and NCHS were to provide the structures and resources for QI teams and co-sponsor learning-sessions, PFA and IHI were to provide QI technical support and transfer of skills and knowledge of QI concepts to QI teams, BMGF were to provide funding for PFA and IHI activities and not for direct inputs into the health system or providing financial support to QI teams and health facilities. PFA's aim was to test the effectiveness of QI as a means of accelerating the achievement of MDG's 4 &5 through the implementation of the national MNCH policy and not to test the effectiveness of the specific interventions themselves. It was piloted and scaled up nationwide over eight year's period. The QI methods used were based on the MFI and the IHI Improvement collaborative model with the PDSA tool discussed above(41,68)**.** The budget and cost-effectiveness for the project could not be accessed for this review; hence it will not be discussed**.** Regrettably, anecdotal evidence suggest that sustaining the gains has been a challenge two years after project life cycle due to lack of resources and stewardship.

The frontline health workers formed QI teams (four to ten members) representing health facilities made up of multi-disciplinary professionals (doctors, midwives, health information officers) to lead the implementation. They used an adaptive type of theory of change, 'the driver model' **(see figure five below)** to identify system gaps that can lead to preventable child death. They then used problem analysis tools (fishbone, problem tree) to find the root causes of the gaps, in order to develop change ideas with aims, based on local data for testing and refinement in an iterative manner using the PDSA tool. QI teams attended two to three days learning-sessions every four to six months. During these, they were thought concepts of QI and shared implementation experiences with the peer network of QI teams from other health facilities. Teams were assisted using the MFI and PDSA tools to track their performance, identify

challenges, modify and institute corrective measures for progress. Subsequently, they were followed-up and mentored by project facilitators every four to six weeks in their respective facilities. The follow-ups were meant to track progress using data and help teams improve and reinforce QI concepts. Follow-ups were done, either via on-site visits or phone calls(41,68).

Following the implementation of the PFA project; healthcare facilities practices improved in the triaging of seriously ill pregnant women and children, linking mothers with community health workers for PNC, effective collaboration with Traditional Birth Attendants (TBAs) in referring pregnant women and ill children to health facilities promptly, health seeking behaviour and proper use of treatment protocols for diseases such as malaria(41,68).

On the whole, the QI intervention by PFA in Ghana has been deemed a success because it achieved its objective of using QI to scale up MNCH services nationwide, amidst some challenges of sustainability(41).

Figure 5 Driver Diagram of Preventable Child Deaths in Ghana

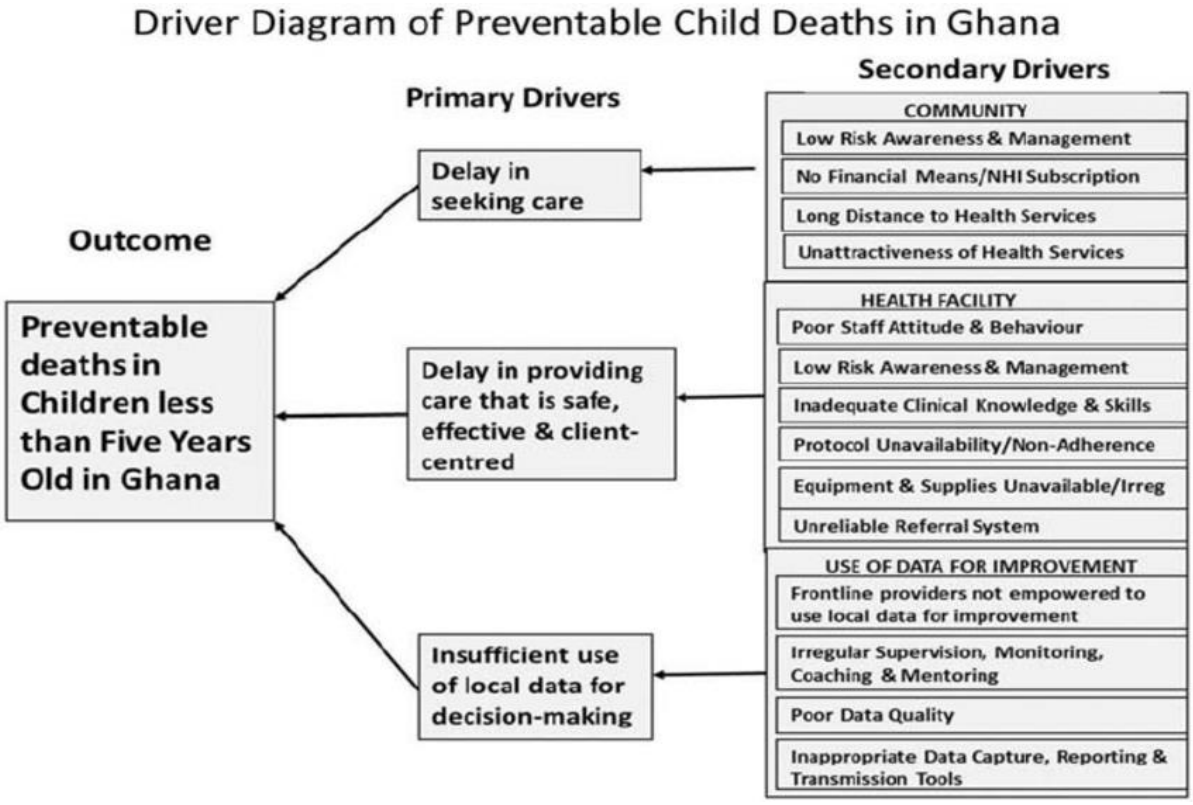


Figure five Showing the Primary and Secondary Drivers of Preventable Under-5 Deaths In Ghana Used by PFA's QI Intervention(40)

3.1.5 Measuring QI Implementation on MNCH- What is used to measure/evaluate them?

The Donabedian framework of structure, process and outcome, discussed above, serves as the foundation for measuring and evaluating QI interventions. What is to be measured or evaluated

in healthcare is either a structure, process or an outcome. The extent to which the indicators for these is achieved, determines the success of the programme/project when measured or evaluated. See **annex two** for details of QI measurements.

On the whole QI interventions are said to be complex in nature and measuring and evaluating them poses a challenge to researchers since they operate within a fluid health system that is difficult to predict, standardize and control. The next section uses the CFIR to evaluate the determinants of QI implementation in Ghana and other LMIC.

3.2 Facilitating Factors Contributing to QI Methods Implementation on MNCH in Ghana and other LMIC

3.2.1 Intervention Characteristics

The intervention source and understanding the QI concepts in terms of the methods, tools, that were used by PFA in Ghana's QI intervention, enabled acceptance of the intervention by health leaders, managers, frontline workers and other relevant stakeholders such as community volunteers. It demystified the complexities there in and made them feel comfortable and confident to use the concepts. Again engaging and involving QI teams in identifying health problems and generating change ideas using the tools made them feel that the interventions were emanating from them and felt responsible for their outcomes. This facilitated the implementation process(40,69).

Similar evidence was adduced from the Maternal and New-born Health in Ethiopia Partnership (MaNHEP) QI projects, the Accelerated Plan (A-Plan) to improve Prevention of Mother To Child Transmission (PMTCT) services in health facilities in South Africa, the USAID QI project on MNCH in Niger, the Makhainda QI trial in Malawi and a systematic review on QI in LMIC(18,20,45,70–72).

Pertaining to Trialability, Twum-Danso et al. 2012(69) argued that, starting on a small scale with generating and testing change ideas in a few facilities using the PDSA tool to ascertain feasibility in a trial phase, identifying the best and effective change ideas from different QI teams in a network of QI collaborative and packaging them for scale up, facilitated the success of implementation and national scale up. For instance, through this, they were able to achieve a threefold increase in PNC utilization in Day one or two within 12 months of intervention in the three northern regions of Ghana. **The strength of evidence** in this example was subsequently used to convince other facilities and stakeholders to buy into the QI project which received wide acceptability(69).

This was also echoed in the other LMIC, rehashing the importance of experimenting change ideas before scale up to promote their acceptability and sustainability(18,20,45,70–72).

As part of **intervention adaptability**, QI teams in some districts co-opted influential community members such as TBA's, youth leaders, licensed chemical sellers and transport owners who were initially not part of the teams. This strategy was employed across all QI teams to suit their peculiar context and was found to be useful in enabling communities to embrace and support the QI intervention(69). Again mainstreaming QI activities into the overall health activities of GHS by creating QI teams at all levels was helpful. QI activities became part of regular monitoring and supervision activities at all levels. It was also incorporated into staff performance appraisals and review meetings. This was meant to promote sustainability(40,68,73,74). This was similar to what pertained in other LMIC(18,20,39,45,70–72).

The intervention design quality from the outset, allowed flexibility in adapting itself throughout the project lifecycle to fit for purpose. This was demonstrated by the PFA project in Ghana, where its focus was changed from diarrhoea and pneumonia in under-fives to continuum of care from ANC to PNC through to under-five, in response to the felt needs of the frontline staff, managers and communities. Additionally, PFA continuously redesigned itself in so many ways such as changing relationship with other partner organisations, changing the content of training of its staff, modifying the duration of certain phases of the project in response to available evidence(40,69). This assertion was supported by other LMIC indicating that when interventions are flexible, it enhances their adaptability which facilitates implementation in varied contexts(18,20,45,70–72).

In a nutshell, the **source of the intervention** coupled with its design in terms of **trialability, adaptability** are critical in facilitating QI implementation and scale up in Ghana and other LMIC in this review. The **evidence** generated was used to convince others about the viability of the intervention. However, evidence could not be adduced for **relative advantage, complexity and cost** constructs of the intervention characteristics domain.

3.2.2 Outer Context

With regards to **External policies and incentives**, government already had an existing national policy on MNCH. In fact, it was this very policy that the QI intervention sought to accelerate its implementation. Therefore QI became a vehicle to roll it out. Additionally, the free maternal health policy sanctioned by the government of Ghana, together with PFA's QI intervention facilitated and incentivised the utilization of MNCH services in the project catchment area. It eased the implementation process by removing the direct cost of accessing health care by mothers and their children. As a result, mothers and communities responded positively to calls to seek healthcare promptly to avert complications. This complemented the PFA's QI intervention aptly(68,73)**.** Findings from the other LMIC also indicated that supportive external policy was critical to ensuring smooth implementation(18,20,45,70–72).

Clients' needs and resources: Availability and accessibility to essential health supplies at health facilities such as medicines were found to facilitate MNCH service utilization by mothers and their children in Ghana's QI project. Other reported incentives that attracted clients to health facilities included free provision of food and snacks to pregnant women after delivery, free supply of mosquito nets to pregnant women during ANC and after delivery and free supply of soap to pregnant women throughout the continuum of care. TBA's who wield a lot of influence were also given soap as a reward for promptly referring clients to health facilities. During such occasions, health workers took the opportunity to educate these TBA's on danger signs for mothers and babies. This enhanced collaboration with TBA's, resulting in increased attendance at health facilities. Funding for these activities came from Internally Generated Funds (IGF) at the health facilities and not from the project budget of PFA, who were only responsible for transfer of skills and knowledge to QI teams(73).

The availability and accessibility to medical logistics for clients' healthcare needs was also found to facilitate QI implementation in other LMIC. However the provision of free food, snacks and soap to clients was found to be exclusive to Ghana's case in this study(18,20,45,70–72).

Cosmopolitanism defined as the degree to which organisations are networked(43) played a role in facilitating QI implementation. For instance, donors such as Danish International Development Agency (DANIDA), Catholic Relieve Service (CRS), and Japanese International Cooperation Agency (JICA), supported in the construction of Community based Health Planning Services (CHPS), which serve as the entry point into the healthcare system. They also provided logistics such as blankets and mosquito nets to healthcare facilities to be given to pregnant women. Others such as UNICEF funded regional review meetings and provided motor bikes and fuel to facilitate outreach services of QI teams. This collaboration among partners was complementary and said to have immensely facilitated the QI implementation(73).

Similarly, the A-Plan QI project in South Africa had six NGO's collaborating with district health managements to implement the project. Some provided logistics and infrastructure while others provided technical support in the form of QI skills transfer, coaching and mentoring(70). No evidence was adduced for the QI projects in the other LMIC in terms of cosmopolitanism.

Peer pressure played a role between facilities of GHS and NCHS, who implemented the QI intervention throughout the country. The tracking of the project progress continuously compared the performance of facilities belonging to these two organisations. This engendered a healthy competition between them and made the leadership of both organisations to strive for good performance from their health facilities. This interest of leadership facilitated the implementation of QI in their facilities(40). According to some studies in LMIC, due to the success of the QI projects in some health facilities, there was pressure on other facilities to adopt the QI methods, which led to their spread, showcasing the facilitating effect of peer pressure on QI implementation(20,70,72).

In summary, the most important **outer context** factors such as; external policy and clients' needs and resources, followed by peer pressure and cosmopolitanism, facilitated QI implementation in Ghana and other LMIC.

3.2.3 Inner Context

Readiness for implementation: Availability and accessibility of midwives in health facilities, in Ghana's QI project, as a health system readiness factor, facilitated in the utilization of MNCH services by communities who would have hitherto trekked long distances to access such services. The midwives, who are a critical **human resource**, also provided leadership to the Community Health Officers (CHO's) to carry out outreach services and follow-up of discharged mothers and their children in the communities, which was an integral part of the project. Essentially, the midwife is seen as the leader of the QI team and crucial to QI implementation. Interventions

were done through the existing health system infrastructure and **available resources** to promote institutionalization(73).

This was similar to other LMIC. For instance, the MaNHEP QI project relied on the availability of health extension workers coupled with other resources for implementation to improving maternal health and PNC coverage in Ethiopia, same as the Zambian, Malawian, Nigerien and South African projects(18,20,39,45,70–72).

Recruitment and capacity building of project staff was crucial to implementation success. Capacity building was tailored to the needs of the officers and frontline staff. For instance the technical content of training decreased from the highest level to the lowest levels depending on levels of responsibilities. This strategy ensured all had the requisite skills to perform and that contributed to readiness for QI implementation (40).

Additionally, continuous training of QI teams was also reported to positively influence their professional behaviour, which encouraged clients to patronize health care facilities(73). This was also true for other LMIC context(18,20,39,45,70–72).

Engaging leaders, managers and frontline healthcare workers and developing genuine relationships, played a facilitating role in QI implementation in Ghana(68). The role of leadership in providing and sustaining the vision was important. At the project level, PFA leadership kept a relentless eye on data for decision making and established a culture of open communication and feedback. The project had an external governing board made up of experienced experts in quality improvement to oversee the implementation. In addition, a national steering committee made up of representatives of the partnership of PFA, met regularly to review implementation progress. At partners' level, GHS and NCHS had their existing governance structure infused into that of the PFA almost seamlessly to operationalize the intervention. This was meant to make health workers view the project as part of the health system to facilitate sustainability(40).

Other LMIC agreed that leadership was the sine qua non in the successful implementation of QI at all levels, emphasising the cliché that 'leadership is cause and everything else is effect'. For ease of **access to knowledge and information**, this was available to QI teams through project facilitators who provided coaching and mentoring to teams(18,20,39,45,70–73).

Structural characteristics of capacity within Ghana's health system, to implement the QI intervention nationwide were fairly good, with the availability of health facilities in almost every district across the country. GHS contributed majority of these facilities, complemented by the NCHS. Again, in terms of governance, GHS had RHMT and DHMT in all the regions in the country through which stewardship of implementation of the interventions could be carried out(40,68)**.** This was also found to be an important facilitating factor for QI implementation in other LMIC(18,20,39,45,70–72).

Network and communication: The QI collaborative network of health facilities and the sharing of experiences in terms of successes and failure among QI teams, of testing change ideas coupled with the follow-up mentoring and coaching by facilitators, enabled the implementation process. This peer to peer learning created a positive competitive atmosphere that encouraged teams to strive for improvement in performance. The formal and informal communications among teams and facilitators established rapport among all of them which engendered trust and facilitated implementation(40,68,69,73,75). Similar evidence was adduced from other LMIC. The peer to peer network of collaborative facilities was a common thread that ran through all the QI projects and served as a fulcrum around which the QI projects revolved, emphasising the centrality of network and communication in QI implementation(18,20,39,45,70–72).

Implementation climate: Extrinsic **organisational incentives and rewards** in the form of extra remuneration of QI team members were found to facilitate their performance in the program implementation in Ghana. This was mainly from IGF of health facilities. As a result, QI team members treated their clients humanely resulting in increased utilization of services in the communities(73). This was also found in LMIC such as Niger, Zambia and the systematic review by Marquez et al.(18,20,39).

Celebrating success together, through sharing in publications and travelling for international presentations among leaders, managers and frontline staff all contributed in motivating them. High performing QI teams, viewed intervention as **compatible** with their routine work; hence facilitated the implementation in Ghana, (37). The **climate** during **learning-sessions** allowed QI teams to give feedback on their goals, reflect, evaluate and learn from each other and re-align their goals where necessary. This made team members feel valuable and knowledgeable partners to the change process(40,68)**.** This was also supported by evidence from other LMIC(18,20,39,45,70–72). There was no evidence found for **tension for change, relative priority** and **culture** in this review.

In short, readiness for implementation, structural characteristics, network and communication and implementation climate were important for QI implementation. More importantly, resource availability and leadership commitment were crucial in facilitating QI implementation in Ghana and other LMIC.

3.2.4 Program Implementation Process

Engaging community **change agents** and QI intervention **champions** such as Community Health Volunteers (CHV's), **opinion leaders** (Chiefs, assemblymen), women and men support groups and TBA's who have a voice was found to be an important facilitator of QI process in Ghana's case. For example, influential **opinion leaders** were used to change the minds of some men, who would not allow their wives to utilize MNCH services in health facilities and convinced them to support them to access the services, which yielded positive results**. Opinion leaders** such as chiefs were able to point QI teams to communities with peculiar health needs for appropriate outreach measures to be conducted. Through the stakeholder engagement, rapport

was established with communities which were leveraged by QI team members to facilitate their work. The CHV were used for health promotion activities and community mobilization, which facilitated the implementation process. This culminated into the acceptance of the interventions by communities(40,73,75).

Similar evidence was adduced in other LMIC. For instance, in Ethiopia, TBA's and community health development agents were used to implement QI project to improve maternal, neonatal and PNC coverage in selected districts(18,20,71,72).

Planning: Having a comprehensive plan of the number of project officers to oversee various QI teams and the schedule of visits and following the plan through facilitated the implementation process. The PFA QI project in Ghana liaised with managers of the health facilities to select multi-disciplinary core QI teams who were key to providing care to clients and therefore could implement interventions and influence other staff as extended team members. This was meant to encourage facility wide adoption of QI and serve as a backup for staff attrition.

As part of the QI work plan, teams were encouraged to set ambitious but achievable goals and expected to deliver on them. The project officers followed this through as scheduled with teams. After applying the PDSA tool to test change ideas in a rapid cycle, the outcome was to adopt, adapt or discard the change ideas based on the evidence available. The high impact change ideas were then scaled up to other teams who were also to adapt these change ideas to suit their context. The PFA used the learning-sessions to disseminate change packages from the various QI teams(40). This was also found to be true for other LMIC where comprehensive planning facilitated QI implementation(18,20,39,45,70–72).

Program execution was done according to plan as far as possible but inherent in the design was an adaptability mechanism mentioned earlier to respond to realities on the ground. In both Ghana and other LMIC, execution process exposed unintended effects which required redesigning to surmount. This way of executing the program, facilitated QI implementation(18,20,39,40,45,70–72)**.**

Reflecting and Evaluating: Regular and transparent feedback using data from collaborative facilities and routine health information database of the health system, at review meetings helped to track progress. Continuously keeping the eyeball on the data and reflecting on it to drive decision making by project staff, leaders, managers and frontline staff , was an integral part of the QI design in Ghana similar to what pertained in other LMIC. This enabled appropriate and timely interventions to be exacted as corrective measures for QI implementation(18,20,39,40,45,68,70–72).

In summary, executing those plans and continuously reflecting and evaluating them, facilitated QI implementation in this review but more importantly, engaging appropriate stakeholders at all levels is critical for successful QI implementation in both Ghana and LMIC.

3.2.5 Individual Characteristics

Knowledge and Beliefs about Intervention and Self Efficacy: Empowering frontline workers on QI concepts and providing evidence of their efficacy made them believe in the interventions and this generated interest and enthusiasm to drive implementation process in Ghana's case. This was done during the learning-sessions and follow-up mentoring and coaching. Having palpable results to showcase by QI teams themselves after generating and testing change ideas, reinvigorated their self believe and resolve about the intervention. This was found to be true for high performing teams and also encouraged some low performing teams to spur on(68,69,73)**.** Similar evidence was found for other LMIC emphasising the power of evidence in influencing people(18,20,39,45,70–72).

Individual stage of change: Maintaining trained, cohesive and motivated teams who have gone through individual and collective stages of change ensures team stability and consistent performance of implementing QI interventions. Teams that had good interpersonal relations and were not disrupted in the course of the project through attrition, maintained a high performing tempo as compared to those who lacked these attributes in Ghana's case(40,68,69)**.** Similarly, this was corroborated by the Zambian and Nigerien QI projects(20,39). There was no evidence for **personal attributes** and **individual identification with organisation** in this review.

The team members' ability to perform was crucial but more importantly the knowledge and believes, coupled with QI team stability for QI implementation per this review in both Ghana and LMIC.

3.3 Inhibiting Factors to QI Method Implementation on MNCH in Ghana and Other LMIC

3.3.1 Outer Context

Clients' needs and resources: Failure to assess community health needs and the barriers to providing interventions can affect QI implementation. For instance in Ghana's case, cultural beliefs such as keeping pregnancy secret for the first trimester, disposal of placenta, hiding new born from public and refusal to immunize them, married and faithful women not supposed to deliver in health facilities among others inhibited QI team efforts in some communities. Understanding this was imperative in order to map out appropriate ways to bring change. Importantly, poverty in some communities disabled some of them from attending health facilities because they could not afford transportation cost and others could not feed themselves while in the health facilities(73,75). No evidence was adduced for the other LMIC on clients' needs and resources.

External policy and incentives: In Ghana, dwindled funds due to withdrawal by some donor organisations and non-payment of NHIA claims to health facilities, suffocated their initiative of incentivizing clients with soap, snacks and free food to attract them to health facilities. Additionally, learning sessions stopped due to lack of funds for GHS to co-sponsor them(73,76).

Similar evidence was found in Zambia and Niger(20,39). Lack of good roads and inaccessibility of certain communities affected follow-up activities of QI teams in certain parts of the Northern Region of Ghana. Seasonal migration due to economic needs of women in some communities posed a challenge for effective follow-up. Some women migrated during pregnancy while others did shortly after delivery. Therefore the QI teams could not access them. Consequently, this affected QI implementation process(75).

There was no evidence of **cosmopolitanism** and **peer pressure** inhibiting QI implementation. On the whole, Poor external policy environment to provide resources and incentives to support QI implementation, contributed in inhibiting QI implementation in Ghana and other LMIC in this review.

3.3.2 Inner Context

Readiness for implementation: Poor health system readiness in terms of **lack of resources** inhibited the QI implementation process. For instance inadequate transportation for health facilities such as motorbikes, pickups, ambulances for outreaches, monitoring and supervision and referrals, constituted a challenge. As a result, some QI teams couldn't carry out regular supervision and outreach activities and refer clients for further continuity of care. Some pregnant women had to be conveyed to health facilities using motorbikes, bicycles and taxis for those who could afford. Due to the inconvenience, some pregnant women resigned to deliver at home. Additionally, the lack of infrastructure (delivery rooms, beds and reliable electricity) and inadequate skilled staff hindered optimal staffs' performance(68,73,76). Again the hiccups in the readiness regarding health information data quality, timeliness and completeness was a problem(69,74).

Similarly, QI projects were delayed in implementation in Malawi and Niger due to lack of skilled staffs(20,45).

Non-committed leadership from DHMT and QI teams was said to inhibit QI implementation and scale up in some districts in Ghana(68). Consequently, they were unable to galvanise team members and communities to support QI activities(74,75)**.** Similar findings were elicited in Zambia, Niger and Ethiopia. For instance, trained QI teams in Zambia could not influence other staff in health facilities to embrace QI, hence they failed to implement it(20,39,71,72).There was no evidence of **access to knowledge and information** inhibiting QI implementation in this study.

Organisational culture: Staffs of GHS were accustomed to being paid by new projects that were implemented in the past. Therefore the approach of PFA to only provide knowledge and skills transfer, was seen as alien and didn't enthuse some of the staff and community change agents to embrace the project. They expected additional financial rewards from the project which was not part of the design. This became detrimental to project progress and indicative of the role

of organizational culture in implementation of interventions(73)**.** Similar findings were in other LMIC(20,39,71,72). Evidence could not be adduced for the rest of the constructs in this study.

Negative organisational culture contributed in inhibiting QI implementation in Ghana and other LMIC but more importantly poor health system readiness and non-committed leadership.

3.3.3 Individual Characteristics

Individual stage of change: One of the factors that inhibited the QI implementation was the high staff turnover due to transfers, going for further studies and retirement. This affected their stage of change in terms of progress in QI skills acquisition and team stability. In some cases, these staffs, especially midwives, were not replaced. Those who were could not fit in functionally because of lack of QI training. This disrupted some QI teams' dynamics resulting in derailing the progress of teams(73,75). Some teams were also geographically dispersed and could not meet regularly to deliberate on progress of work(75)**.** This resonated with findings from the other LMIC. High staff turnover was identified as a common inhibiting factor in almost all the studies in LMIC, highlighting the critical role trained staff play in QI implementation(18,20,39,45,70–72). Evidence was not found for the other constructs in this study.

3.4 Factors Contributing to Sustainability of QI Methods Implementation after Project Lifecycle

It was not possible for this study to elicit factors contributing to sustainability of QI interventions in Ghana after the PFA's project lifecycle. All the publications used for this review, were either carried out during the project implementation period or just immediately after that; hence there are currently no sustainability studies carried out for review in Ghana's context, apart from relying on anecdotal evidence which suggest that the momentum of sustaining the gains has waned. Therefore, there is the need for sustainability studies to better understand emerging issues on QI in Ghana.

However a QI sustainability study conducted by USAID in Niger identified the following cross cutting factors influencing sustainability; leadership support at all levels, resource availability, continuing staffs training and learning-sessions, continuous coaching and mentoring of frontline staff, engaging and motivating staffs, including QI activities in action plans and partners support(20).

Chapter 4: Discussion

This chapter draws from the previous chapters to discuss the findings of this review under the specific objectives of factors that facilitate, inhibit or sustain QI implementation as per conceptual framework.

4.1 Factors Contributing to QI Methods Implementation in Ghana and Other LMIC

Intervention characteristics such as conceptual clarity and **source of intervention, intervention design, adaptability, trialability and evidence strength** were crucial to facilitating QI implementation in Ghana and other LMIC. Key stakeholders needed to be clear with the QI concept in terms of the methods and tools (MFI, PDSA) used to execute the intervention and the principles and philosophy behind those. This promoted embeddedness of interventions into their work. It is not all people who easily appreciate frameworks, data, charts and how to track them to make meaning out of them. Therefore disentangling and simplifying them for all stakeholders to understand is important. The generation of change ideas locally by QI teams and communities and testing (**trial**) and redesigning 'home grown' solutions (**adapting**) to contextualised problems promoted ownership and acceptance of QI interventions. Positive outcomes as **evidence** bolstered their confidence and self-belief in the intervention which made them want to achieve more. This was contrary to what Bouchet et al.(39) found in the Zambian experience where key stakeholders such as health workers were oblivious of certain concepts in the quality assurance project and were not involved in the development of QI guidelines, which they did not appreciate; hence abandoned its use(39).

This emphasises the importance of building the capacities of relevant stakeholders such as frontline staffs and communities and empowering them to be able to practice QI by being able to identify health problems, generate change ideas and using the QI tools to actually solving those problems based on local circumstances. This is in tandem with what Davis et al.(28) said about factors facilitating QI; of building staffs capacity and empowering them to practice QI(28). This is possible if the intervention design allows it. Designs that are flexible and responsive are easily adapted to different context, enhancing their success and sustainability.

Outer context characteristics such as **external policies, health system readiness, community needs perceptions and resource availability** facilitated QI implementation for MNCH in Ghana and other LMIC's context. For instance, the availability of a policy on MNCH in Ghana enabled the intervention to be designed and implemented, nested within the policy objectives of the health system. This together with other policies such as the free maternal health by the NHIA, acted in concert to facilitate the implementation process. Additionally, Since the MNCH policy was already part of the health system, health workers and other stakeholders were already familiar with it. Moreover, it was already been implemented at different scales nationwide. Therefore it softened the grounds for the PFA to implement the QI intervention in Ghana. This was an important factor in other LMIC too. In contrast, the Zambian QI evaluation showed that there was no national policy to align QI goals to. As a result, it affected institutionalisation into the health system(39**).**

Apart from availability of existing policies to support QI implementation, the external policy environment should also provide resources to prepare the health system to be able to successfully implement QI for MNCH in a sustainable manner. Again this is in line with one of the facilitating factors mentioned by Davis et al. (28) of the provision of resources for QI activities. In furtherance, the outer context which entails the sociocultural, political and economic environments can impinge on all the other domains. It determines the availability of infrastructure (roads, health facilities), the socioeconomic wellbeing of clients' and the overall architecture within which QI can be implemented. For instance, due to economic reasons, women migrate seasonally from the northern part of Ghana to the south to earn income hence following them up as part of QI activities became impossible. Therefore the outer context has an undeniably central role to play in facilitating QI implementation in LMIC.

Interestingly, the collaborative role of NGO's and other international organisations in terms of cosmopolitanism in QI implementation was found in Ghana and South Africa. Their contribution to QI success in these countries was critical to the extent that when some of them withdrew their support, QI activities were negatively affected in Ghana. This highlights the unreliability of the dependence of LMIC on these organisations to prosecute their health agenda on MNCH. It calls for efforts for self-reliance for sustainable QI implementation.

Peer pressure to adopt QI interventions by health facilities due to the positive and palpable evidence produced through the QI activities was also highlighted in this study. It is important for QI interventions to prove themselves through positive results.

Inner context characteristics are influenced by the **outer context** in terms of the **external policy** environment and availability of **incentives and resources** to support QI implementation readiness. Additionally, the commitment of **leadership** in terms of stewardship at all levels was found to be critical in facilitating QI implementation in all the studies. Leadership is a cross cutting factor across all the domains that is a sine qua non in QI implementation and has to be taken seriously in LMIC, supporting what Davis et al. (28) and others(33,34) found in HIC about the role of leadership in QI interventions. Where leadership support was not harnessed, QI implementation and sustainability was inhibited. There is a thin line between the outer and inner context since their constructs mostly influence each other. The resources, both human and material required within the inner context of QI interventions mostly emanate from the outer context. Therefore the lack of resources, from the outer context, inhibited QI implementation and sustainability in LMIC.

Notably, QI interventions per this study were designed to be implemented through the existing health system structure to promote sustainability. The national scale up of QI in Ghana could partly be attributed to the structural characteristics of the health system in terms of the governance structure and availability of health facilities in most parts of the country contributed by GHS and NCHS. This implies that QI interventions require a reasonable availability of a robust health system structure to facilitate their implementation in LMIC. This again is partly

determined by the outer context, emphasising its influence on other domains of the CFIR. Related to this is the important role of incentivising QI teams with extra remuneration, which was found to facilitate their commitment to the implementation process. When this was stopped it inhibited QI activities in Ghana.

The extra remuneration of QI teams is linked to the organisational culture of expecting financial rewards from newly introduced projects perceived to be externally driven. This negative culture defeated the essence of implementing the QI project through the health structure to make staffs feel it was part of their routine job.

Network of collaborative facilities provided a platform for experience sharing and adoption of evidence informed change ideas among QI teams. It was also an opportunity for reflection and evaluation of teams' performance and transparent feedback. This serves as the heartbeat of the QI collaborative and empowers and builds the capacity of frontline staffs through participatory learning. Whenever this was stopped, it inhibited the QI implementation in LMIC, indicative of it being an important characteristic of the QI collaborative as described by Øvretveit et al.(66).

Program implementation process in terms of **planning**, **stakeholder engagement**, **project execution** and **evaluation** as mentioned earlier, were important in driving the implementation process in Ghana and other LMIC settings.

Developing a comprehensive plan of selecting the number of health facilities and QI teams coupled with the number of facilitators to provide effective mentoring and coaching and the appropriate times to scale up, facilitated the successful nationwide implementation of QI in Ghana's case and other LMIC.

As part of implementation process, management of health facilities in Ghana's case selected dedicated frontline staff including management members to form QI teams. This made it easier to spread QI concepts in health facilities to promote institutionalisation, since management formed an integral part of the teams. In contrast, this was not the case in Zambia, where the QI teams could not influence other frontline staff to accept QI in their work, hence implementation was poor. This was because teams did not have the authority over other staff and management members were not part of the teams to exercise authority for adoption of QI interventions(39). Therefore it is important for managers and leaders to be part of QI teams in LMIC to facilitate institutionalisation of QI interventions into health systems.

Additionally, engaging stakeholders such as community opinion leaders, who know their context better, can contribute in identifying their needs and champion QI activities. This is what Ashraf(57) meant by; engaging people to produce health themselves based on their needs with support from the health system.

Apart from the reflection and evaluation which was done at learning-sessions, follow-up site visits allowed QI facilitators to provide hands on mentoring to QI teams and help them resolve

teething problems. Apart from maintaining the intensity of implementation, it also gave a sense of security to teams, knowing they had facilitators to lean on in time of difficulty. It was also used to whip up management support for QI which was needed for successful interventions.

Individual characteristics such as the **knowledge, beliefs and state of change regarding the intervention** are important. Leaders, managers, frontline staffs and other relevant stakeholders should be convinced about the efficacy of QI interventions. This can only be possible if they are knowledgeable about the concepts of QI through continuous training and evidence obtained from testing change ideas. As they go through this process, they evolve in maturity regarding QI which is meant to instil a QI culture in their work. Therefore it is important to allow staffs to go through this change process without disruption. This implies that for QI implementation to be institutionalised and sustainable in LMIC, attention has to be paid on training more healthworkers on QI concepts to have a back up for possible staffs attrition. This calls for more resources to be allocated for healthworkers capacity building on QI, which is often a challenge in LMIC context.

Essentially, all the barriers to QI implementation eventually culminated into affecting the sustainability of the interventions. Therefore it stands to reason that in order to address the problem of sustainability, decision makers ought to focus on these areas.

In addition to the limitations mentioned in the methodology section, there was only one sustainability study found for this review on QI for MNCH in LMIC, making it difficult to properly address the sustainabilty question for this study. Again cost effectiveness studies could not be accessed for QI in LMIC for MNCH to enrich the review. Cost effectiveness studies in the context of LMIC where there is often inadequate resources is critical to determine the sustainabilty of QI interventions for MNCH.

On the whole the CFIR proved useful in this study. It was possible to use it to summarise, analyse and synthesise all the studies reviewed. The domains and constructs were easy to understand and interprete and largely applicable to the studies. However evidence could not be adduced for certain thematic areas of the domains and constructs such as; relative advantage, complexity, cost of interventions, tension for change, personal attributes and individual identification with organisation. It is possible that this is due to the limited number of studies found on QI for MNCH in LMIC settings. Therefore it will be premature to conclude that these missing themes are irrelevant for the framework. Further research is required to be able to draw such conclusions. Moreover, the framework does not show the relations beween the constructs mentioned earlier. However this is not surprising, considering the complexity of the factors acting within the health ecosystem. It will be almost impossible to establish such a rigid relations inductively. Therefore it is reasonable to deductively establish the relations between constructs after its application based on the context.

Chapter 5: Conclusion and Recommendations

This chapter draws from previous chapters to conclude and give recommendations to policy makers, programme managers, public health researchers and relevant stakeholders interested in setting up and improving QI activities on MNCH in LMIC settings based on the findings of this study.

5.1 Conclusion

QoC is a multi-dimensional concept made up of six dimensions (effective, efficient, accessible, acceptable/patient centred, equitable and safe). It should be approached from a health system perspective which provides a framework for access to healthcare by linking provision and experience of care. QI in health is a continuous process of using evidence informed interventions to improve health systems structures, processes and outcomes, based on the six dimensions.

There are five major approaches of QI identified but the commonest in LMIC are based on the QI collaborative approaches by IHI. QI interventions can be measured and evaluated in terms of structure, process and outcomes using several approaches such as the CFIR, which was used for this study.

Notably, factors facilitating QI intervention fell under five domains namely: **intervention characteristics** such as; clarity of concepts of QI approaches (tools and methods); Intervention design in terms of trialability and adaptability**; Outer context** factors such as external policy environment to support and incentivise QI implementation, cosmopolitanism of network of complementing organisations, peer pressure to engender healthy competition and availability of resources to meet clients' needs; **Inner context** factors such as health system readiness for implementation, structural characteristics, network and communication of QI teams and stakeholders, implementation climate and leadership engagement and commitment; **Program implementation processes** such as engaging stakeholders in planning, executing those plans and continuously reflecting and evaluating them; **Individual's characteristics** of knowledge and beliefs regarding interventions and team members' stability and ability to perform was crucial for QI implementation per this review.

Inhibiting factors which also affected sustainability fell under three domains including: **outer context** factors such as; poor external policy environment to support and provide resources and incentives for health systems and communities to implement QI interventions; **inner context** factors such as non-committed leadership at all levels and poor organisational QI culture and **individual characteristic** factors of high staffs turnover disrupting the stability of QI teams.

Overall, leadership commitment at all levels, availability of resources including human resources and a supportive policy environment from the outer context were cross cutting issues.

The CFIR proved useful in helping to summarise, analyse and synthesise the determinants influencing the implementation of QI for MNCH in LMIC in this study.

5.2 Recommendations

5.2.1 Policy Makers:

1. Policy makers should develop comprehensive policies on MNCH and QI for the health sector. The policy on MNCH will then form the overarching framework to guide the implementation of the QI policy. These policies should be developed with all relevant stakeholders such as policy makers, healthcare providers (public and private), clients, NGO's, who have roles to play, to ensuring the incorporation of their views to promote ownership and acceptability. There should also be implementation, evaluation and accountability plans showing clear lines of authority, communication and responsibility to ensure that the policy is practiced and not placed on the shelf.

2. Policy makers at the national, regional and district levels should form functional QI units and make QI an integral part of their action plans in order to integrate it into the overall objectives of the health system to avoid verticalisation of activities and seeing QI as separate from routine functions of the health delivery system. Further, QI should be made part of the job description of all health workers to solve the problem of labelling specific staffs as QI staffs. This will make all staff competent in QI and help solve the problem of high staffs turnover leading to disruption of trained QI teams. Furthermore, managers of health facilities and frontline staffs should make QI activities part of their performance agreements and appraisals to form part of the basis for their assessment and promotions. This will promote leadership commitment, institutionalisation and sustainability leading to a culture of QI in the health systems for MNCH.

3. Policy makers should continue to use evidence from research to advocate for improvement in the general socioeconomic conditions of the outer context within which the health system operates and allocation of resources to the health sector from politicians, donor organisations and NGO's to prepare the health sector to be able to implement QI interventions in a sustainable manner, particularly for MNCH which continues to contribute to the disease burden of LMIC.

5.2.2 Programme Managers:

1. Programme managers should endeavour to engage all relevant stakeholders such as healthcare leaders, managers, frontline staffs, community leaders such as chiefs when identifying health needs and designing QI intervention for implementation for MNCH in LMIC. This will allow the design of interventions that are adaptable, acceptable and responsive to the needs of beneficiaries. In addition, they should build the capacity of these stakeholders on the concepts of QI through training. Leaders and managers of health facilities should be incorporated into all QI activities to promote their commitment.
2. Programme managers should adopt the IHI model for improvement and PDSA tool to generate evidence through an iterative cycle of testing change ideas. This can then be

used to build evidence that works for an incremental scale up. This should be done with the collaborative peer to peer learning sessions and follow-up mentoring and coaching of health facilities implementing QI interventions for MNCH. This has proven to engender trust, commitment and ownership in this study.

5.2.3 Public Health Practitioners and Researchers:

1. There is the need for further sustainability studies on QI implementation for MNCH in the context of LMIC in order to have a better insight into the determinants of sustainability in QI for MNCH. This may be done using a pre/post intervention study design to measure changes in the continuous implementation of QI for MNCH using the indicators set at the beginning of the intervention as the basis. Health facilities that took part in QI intervention could be sampled and assessed using data collection tools such as in-depth, focus group and key informant interview guides to collect data for analysis to gain more insight into the determinants of sustainability of QI implementation for MNCH in LMIC settings to contribute to the discourse on QI interventions.

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Annex 1 Description of constructs of CFIR(43)

Construct		Short Description
I. INTERVENTION CHARACTERISTICS		
A	Intervention Source	Perception of key stakeholders about whether the intervention is externally or internally developed.
B	Evidence Strength & Quality	Stakeholders' perceptions of the quality and validity of evidence supporting the belief that the intervention will have desired outcomes.
C	Relative Advantage	Stakeholders' perception of the advantage of implementing the intervention versus an alternative solution.
D	Adaptability	The degree to which an intervention can be adapted, tailored, refined, or reinvented to meet local needs.
E	Trialability	The ability to test the intervention on a small scale in the organization, and to be able to reverse course (undo implementation) if warranted.
F	Complexity	Perceived difficulty of implementation, reflected by duration, scope, radicalness, disruptiveness, centrality, and intricacy and number of steps required to implement.
G	Design Quality & Packaging	Perceived excellence in how the intervention is bundled, presented, and assembled.
H	Cost	Costs of the intervention and costs associated with implementing the intervention including investment, supply, and opportunity costs.
II. OUTER SETTING		
A	Patient Needs & Resources	The extent to which patient needs, as well as barriers and facilitators to meet those needs, are accurately known and prioritized by the organization.
B	Cosmopolitanism	The degree to which an organization is networked with other external organizations.
C	Peer Pressure	Mimetic or competitive pressure to implement an intervention; typically because most or other key peer or competing organizations have already implemented or are in a bid for a competitive edge.
D	External Policy & Incentives	A broad construct that includes external strategies to spread interventions, including policy and regulations (governmental or

		other central entity), external mandates, recommendations and guidelines, pay-for-performance, collaboratives, and public or benchmark reporting.
III. INNER SETTING		
A	Structural Characteristics	The social architecture, age, maturity, and size of an organization.
B	Networks & Communications	The nature and quality of webs of social networks and the nature and quality of formal and informal communications within an organization.
C	Culture	Norms, values, and basic assumptions of a given organization.
D	Implementation Climate	The absorptive capacity for change, shared receptivity of involved individuals to an intervention, and the extent to which use of that intervention will be rewarded, supported, and expected within their organization.
1	Tension for Change	The degree to which stakeholders perceive the current situation as intolerable or needing change.
2	Compatibility	The degree of tangible fit between meaning and values attached to the intervention by involved individuals, how those align with individuals' own norms, values, and perceived risks and needs, and how the intervention fits with existing workflows and systems.
3	Relative Priority	Individuals' shared perception of the importance of the implementation within the organization.
4	Organizational Incentives & Rewards	Extrinsic incentives such as goal-sharing awards, performance reviews, promotions, and raises in salary, and less tangible incentives such as increased stature or respect.
5	Goals and Feedback	The degree to which goals are clearly communicated, acted upon, and fed back to staff, and alignment of that feedback with goals.
6	Learning Climate	A climate in which: a) leaders express their own fallibility and need for team members' assistance and input; b) team members feel that they are essential, valued, and knowledgeable partners in the change process; c) individuals feel psychologically safe to try new methods; and d) there is sufficient time and space for reflective thinking and evaluation.
E	Readiness for Implementation	Tangible and immediate indicators of organizational commitment to its decision to implement an intervention.
1	Leadership Engagement	Commitment, involvement, and accountability of leaders and managers with the implementation.
2	Available Resources	The level of resources dedicated for implementation and on-going operations, including money, training, education, physical space, and time.

3	Access to Knowledge & Information	Ease of access to digestible information and knowledge about the intervention and how to incorporate it into work tasks.
IV. CHARACTERISTICS OF INDIVIDUALS		
A	Knowledge & Beliefs about the Intervention	Individuals' attitudes toward and value placed on the intervention as well as familiarity with facts, truths, and principles related to the intervention.
B	Self-efficacy	Individual belief in their own capabilities to execute courses of action to achieve implementation goals.
C	Individual Stage of Change	Characterization of the phase an individual is in, as he or she progresses toward skilled, enthusiastic, and sustained use of the intervention.
D	Individual Identification with Organization	A broad construct related to how individuals perceive the organization, and their relationship and degree of commitment with that organization.
E	Other Personal Attributes	A broad construct to include other personal traits such as tolerance of ambiguity, intellectual ability, motivation, values, competence, capacity, and learning style.
V. PROCESS		
A	Planning	The degree to which a scheme or method of behavior and tasks for implementing an intervention are developed in advance, and the quality of those schemes or methods.
B	Engaging	Attracting and involving appropriate individuals in the implementation and use of the intervention through a combined strategy of social marketing, education, role modeling, training, and other similar activities.
1	Opinion Leaders	Individuals in an organization who have formal or informal influence on the attitudes and beliefs of their colleagues with respect to implementing the intervention.
2	Formally Appointed Internal Implementation Leaders	Individuals from within the organization who have been formally appointed with responsibility for implementing an intervention as coordinator, project manager, team leader, or other similar role.
3	Champions	Individuals who dedicate themselves to supporting, marketing, and 'driving through' an implementation, overcoming indifference or resistance that the intervention may provoke in an organization.
4	External Change Agents	Individuals who are affiliated with an outside entity who formally influence or facilitate intervention decisions in a desirable direction.
C	Executing	Carrying out or accomplishing the implementation according to

		plan.
D	Reflecting & Evaluating	Quantitative and qualitative feedback about the progress and quality of implementation accompanied with regular personal and team debriefing about progress and experience.

Annex 2 History and types of QI approaches and their Measurement/Evaluation

History of QI in Health

The concept of quality in healthcare has been around for a very long time. Dr.Ignaz Semmelweis in 1847 was able to show that hand washing with chlorine was able to reduce case fatality among pregnant women who came to deliver in his clinic in Vienna and this was before the germ theory(77). Florence Nightingale, the 'mother of nursing' demonstrated the link between hospital sanitation and mortality of wounded soldiers during the Crimean war in 1854. Subsequently, she introduced hand washing, sanitizing surgical equipment and keeping the wards of patients clean and as a result, reduced mortality remarkably from 60% to 1% (78,79). Though these were examples of quality measures adopted at the time, there were no systems in place to promote quality. It was only until the 18th century going, that the health sector learned from the manufacturing sector to systematically introduce QI concepts in its practice.

For instance, in Great Britain, as early as the 1750s-1800s, quality measures were employed in the manufacturing sector during the industrial revolution to assure the quality of products, which were produced through an integrated process by many individuals. This brought about the concept of 'quality control' which used 'product inspection' as a means of ensuring quality and was later used in the weapons and car manufacturing industries. Following this, W.A Shewhart, in 1930 innovated the scientific technique of 'statistical quality control' which was used to reduce wastage and improve the quality of products manufactured by his company Bell electrics. It was able to identify random and non-random variations in the manufacturing process, thereby allowing for corrective measures to be instituted(80,81).

Kaoru Ishikawa invented the 'cause and effect fishbone analysis tool' which is currently part and parcel of many QI approaches. His work focused on continuous improvement ("kaizen"-Japanese term) and the emphasis that it was the responsibility of every staff to ensure improvement where they worked. His ideas revolutionized the Japanese industrial sector between 1950 and 1960 and still a crucial principle in quality management today(61,82).

Armand V Feigenbaum, worked with General Electric (GE) in the 1960s and the originator of 'total quality control', defined as: "*an effective system for integrating quality development, quality maintenance and quality improvement efforts of the various groups within an organisation, so as to enable production and service at the most economical levels that allow full customer satisfaction"*. He views QI as a way of managing and the responsibility of everyone and should be approached in 3 steps; quality leadership, modern quality technology and organizational commitment(61,82)**.**

Joseph Juran, another pioneer of QI, had similar views with his compatriots and advocated for the empowerment of all staff as the means to achieve success in QI. Empowering staff will

ensure that, they assume responsibility for QI efforts and make it an on-going process of everyday work. His philosophy and views were published in the 'quality control handbook' in 1951(61,82).

Consequently, after the influence of the health sector by the manufacturing sector and the adoption of QI concepts subsequently into health, the focus was on the performance of individual healthcare providers, similar to the quality control by inspection applied in the manufacturing sector. It was the 1960s seminal work of Donabedian's framework for the evaluation of quality in healthcare (structure, process and outcome), that broadened the view of quality in healthcare to involve the client behaviour and provider-client relations. This gave birth to the Quality Assurance (QA) concept which was mainly used in hospitals in the developed countries and relied on standards of care set by accreditation bodies(61,79)**.**

Types of QI Approaches in Health and their Measurement/Evaluation

Total Quality Management (TQM)/Continuous Quality Improvement (CQI).

This originated from Japan in the 1950s in the manufacturing sector but gained a lot of grounds in healthcare in the 1990s. TQM and CQI are usually used interchangeably and view QI as a continuous, on-going process of improvement that is grounded in data, led by all levels of management and supported by a motivated staff, working together as a team. Though TQM/CQI have been used in healthcare for QI, there have been challenges with its sustainability within healthcare organisations and their staff(62,83,84)**.**

Business Process Reengineering (BPR)

BPR has its origins from the US in the 1990s. It is considered as a radical approach to organizational change and has not been implemented fully in either the healthcare sector or other sectors. Unlike other QI approaches, BPRs emphasis is on wholesale systems/ organizational change rather than incremental approaches and usually led by a visionary leader in a top-down manner, overhauling and redesigning systems structures and processes of organisations(62)**.**

Lean Thinking

Though not largely applied within the health sector, the focus of it is to streamline processes and reduce wastage. It was developed by the car manufacturing company, Toyota in the 1950s, also called 'The Toyota Production System' and uses tools to enable workforce teams to identify and remove unnecessary processes and 'time wasters' so as improve efficiency. Limited use in the healthcare sector has shown success in reducing waste(62,85)**.**

Six Sigma

This is one of the approaches adopted from industry that has had limited application in the healthcare sector. It uses a structured approach DMAIC (Define, Measure, Analyse, Improve,

and Control) and statistical tools to improve quality and has mainly been used in the developed countries. It requires statistical expertise to be able to monitor variations in a process so as to institute remedial actions to improve quality(62).

Notwithstanding the categorization of these approaches based on individual uniqueness, most of them overlap considerably and are often combined during implementation even in healthcare. Powel et al after a systematic review of the literature suggested that none of the approaches is superior over the other but that they all require 'the necessary' but 'not sufficient' conditions for successful implementation(62). The next section reviews some QI approaches used in LMIC.

Client-Oriented, Provider-Efficient Services (COPE)

COPE was developed in 1987 by Engender Health to help healthcare workers use resources efficiently while improving the quality of healthcare in LMICs. It was one of the first QI interventions USAID, UNICEF, WHO funded specifically for MCH services. COPE was developed in collaboration with MOH in countries where it was implemented and focused on clients' rights and provider needs to improve the quality of MNCH services. The underlying principles of COPE are: 1) develop a customer mind set, 2) involve all levels of staff and foster their ownership, 3) focus on systems and processes, 4) be cost conscious and efficient, 5) engage in continuous QI, and 6) develop staff and build their capacity(55,86).

These can be achieved via a number of steps namely; first, self-assessment where healthcare providers identify health problem/gap that needs improvement, second, healthcare providers carry out a root-cause analysis of the problem and based on findings, develop strategies for improvement. These have been organized into a COPE tool book containing the steps, self-assessment and other checklist for easy implementation. The COPE has been applied in some LMIC such as Kenya, Guinea, Nigeria, and Cambodia where evidence suggests its contribution to improving MNCH. COPE was basically designed for single healthcare facilities, hence it is limited in system-wide application(55).

The Integrated Management of Childhood Illness (IMCI)

IMCI was developed by the WHO and UNICEF in 1992, supported by USAID and other donors. The aim was to promote the wellbeing of children under 5 years by reducing morbidity, mortality and disability through 3 main strategies: improving case management skills of healthcare providers; improving family and community health system and improving the overall health system. Through this, it promotes accurate diagnosis and prompt management of childhood illnesses, prompt referral of very ill children and health seeking behaviour of caretakers of ill children. IMCI also promotes improved nutrition and preventive care. It has been implemented in over 100 countries most of them, LMIC such Ghana, Uganda, Tanzania, Peru and has been credited in contributing to improving the health of children under five, albeit with challenges of sustainability and cost of implementation(55,87,88).

Measuring structure and process

The Statistical Process Control (SPC) has been used extensively in QI since the mid 1990's(78) to detect changes that result in improvement. It measures implementation process quantitatively, making it easy to interpret and monitor data on QI implementation process(89). It is a useful tool for evidence based system management(90,91).Though SPC is said to measure improvement during the process of care with a high level of precision, it is unable to link it to outcomes since so many factors (intrinsic and extrinsic) act to contribute to outcomes. Brown and Lilford describe it as having a 'low signal to noise ratio'(92).

One other tool used to measure structure and process of QI is the CFIR which has been discussed in the methodology section and serves as the framework to analyse and synthesise this study.

The overarching aim of every intervention in healthcare is to have a desirable effect on clients. Therefore it is not enough to measure the structures and processes of delivering those interventions without knowing the final effect on its beneficiaries. To do that, outcome measures must be employed. It is therefore important to incorporate the measurement of both process and outcomes indicators using appropriate techniques such as the Randomised Controlled Trials (RCT's) discussed next(93,94).

Measuring outcomes

Several techniques have been suggested for the measurement of outcomes of healthcare interventions such as RCT's and step wedge designs, Bayesian methods and realist evaluation(94,95). Other commonly used methods in QI interventions are the pre-post-test designs which have a limitation of ruling out pre-existing trends. Other designs such as time-series, equivalent time series, multiple baseline methods have all been considered albeit with their weaknesses of not being able to relate changes to interventions(65).

Interestingly, RCT's are regarded as the gold standard for research. However, few studies exist that have used RCT's to evaluate QI interventions because of difficulty in randomisation and ethical considerations. For instance in the evaluation of the impact of a combined 12 month QI collaborative and chronic care management on children with asthma, together with analysing three process of care parameters, there was no evidence of effect of the intervention on the process or outcome measures(96). Another example and probably one of the first RCT studies in LMIC for evaluation of QI collaborative interventions on MNCH in Malawi, the MaiKhanda trial resulted in a reduction in neonatal mortality by 22%(45). One major weakness of RCT's is their inability to accurately explain why the intervention worked or not. It falls short of measuring the process and the context(97).

Measuring context

WHO posits that the evaluation of QI interventions should be done along with the context within which the intervention took place(3). This involves both inner and outer contexts and consists of measuring formative and summative outcomes of intervention which gives a better understanding of why and how interventions outcomes occur in order to promote their sustainability. (43).