A Review of the Process of Knowledge Transfer and use of Evidence in Reproductive and Child Health in Ghana

By

Gordon Abekah-Nkrumah
Department of Public Administration and Health Services Management
University of Ghana Business School, Legon- Accra.

1.0   Introduction and Background

Evidence-based practice or evidence informed policy-making generally refers to systematic efforts to ensure that research evidence becomes an important input into policy-making [1]. This has variously been referred to as knowledge translation, knowledge transfer, knowledge exchange, research utilisation, implementation, diffusion and dissemination [2]. Evidence-informed policy-making has assumed increased importance in several arenas of policy-making. In the area of health policy, the weight placed on evidence-informed policy is even much greater, with the reason that it leads to optimal allocation and fair distribution of resources, responds to scientific and technological advances and consequently improves health outcomes [3]. Indeed there are a couple of high profile documents that have empahsised the importance of the essence of evidence-based policy/knowledge transfer in the healthcare arena. For example the World health organization (WHO) and the Lord Darzi report on the England National Health Service have all emphasized the need for closer collaboration between users and producers of evidence to ensure that practice is evidence-informed [4].

The idea that virtually all forms of policy should be based on strong scientific evidence can be traced to the establishment of the Evidence-Based Medicine (EBM) framework. At the core of EBM is the use of clinical evidence (resulting from scientific research) to guide clinical practice. The growth of EBM has transcended clinical practice and influenced greatly the call for non-clinicians (policy-makers, government officials and programme managers) to abandon policy development approaches that relies heavily on common sense, popular support and political ideology in favour of approaches that are primarily based on scientific facts/evidence generated through appropriate and robust scientific research. It is not uncommon for discussion about evidence–informed policy to generate debate about what constitute evidence? Generally, evidence can be operationalized to mean facts (actual or asserted) gained through observation or experiences and used to support a conclusion [5]. The National Institute for Health and Clinical Excellence (NICE) further argues that evidence can either be scientific or colloquial [6]. According to NICE, scientific evidence arises from explicit (codified and propositional), systematic (use of transparent and unambiguous methods for codification), and replicable (use of methods that can reproduce results in similar circumstances) scientific methods. On the contrary, colloquial evidence arises from

expert testimony or comments from practitioners and stakeholders that may be crucial in complimenting scientific evidence. Within the innovation literature evidence is also argued to include experiences or received wisdom of individuals [7]. It is important however to emphasize that among the different facts used to support a policy or conclusion, the most reliable is argued to be scientific evidence [8-10]. It is therefore not surprising that stronger health systems around the world (both developed and developing) are believed to be those whose health policies are informed by high quality scientific research evidence [1, 3].

Notwithstanding the importance of using scientific research evidence to guide the formulation and implementation of health policies, the extent to which they are used in Low to Middle Income Countries (LMICs) is limited due partly to weak capacity (skill set and systems) to carry out policy relevant research and ability to translate research finding into a form that can easily be utilised by policy-makers [11]. Besides the issues of capacity, the underdeveloped nature of health systems in LMICs such as Ghana, coupled with the generally low levels of investments in health may also be responsible.

Although Ghana's investment in health has improved over the years and one of the best in the Sub-Saharan African region, it compares unfavourably to other developing countries. For example, health expenditure (HE) as a percentage of Gross National Product (GDP) and HE per capita increased from 3% in 2000 to 5.4% in 2013 and USD 82.4 in 2000 to USD 214.2 in 2013 respectively. Ghana's 2013 figures compares favourably to Kenya (4.5% and USD 44.5), Nigeria (3.5 and USD 115), The Gambia (6% and USD 28.9), Uganda (9.8 and USD 59.1) and Mali (7.1 and USD 53.3). However, Ghana's 2013 figures compares unfavourably to 2013 levels of HE as a percentage of GDP and HE per capita in comparable developing countries such as Paraguay (9.9% and USD 724.3), Chile (7.7% and USD 1677.6), Uruguay (8.8 and USD 1714.6) and Costa Rica (9.9% and USD 1369) [12].

Notwithstanding the relatively low levels of investment, Ghana's health sector has witnessed appreciable progress in several areas over the last one and half decades. Although Ghana did not meet the Millennium Development Goals (MDGs) target on maternal and child health (i.e. MDGs 4 and 5), key outcome indicators in the area of reproductive and child health (RCH) such as the national maternal mortality rate (MMR) reduced by 49% from 760/100,000 live birth in 1990 to 380/100,000 live births in 2013 (World Health Organization, 2014). Indeed, Ghana's 2013 MMR can be considered to be very low compared to that of neighbouring or other African countries such as Nigeria (560/100,000), Niger (630/100,000) and Sierra Leone (1,100/100,000) for the same period [13]. Consumption of reproductive health inputs has also improved tremendously. The report of the 2014 Ghana Demographic and Health Survey (GDHS) suggest that the percentage of women receiving antenatal care from a skilled provider increased from 82% in 1988 to 97% in 2014, with 4+ antenatal visits also increasing from 78% in 2008 to 87% in 2014 [14]. In addition, 78% of women with birth, five years preceding the 2014 GDHS received protection against neonatal tetanus, with

women delivering in a health facility increasing from 42% in 1988 to 73% in 2014. The GDHS 2014 report also suggest that 8 in 10 mothers receive postnatal check-up within the crucial first two days after delivery.

Infant and child health has also improved over the years. For example, infant mortality and under-five mortality have declined by 28% and 44% respectively for the period 1998 to 2014. Additionally, the 2014 GDHS suggest that neonatal mortality and perinatal mortality stood at 29/1,000 and 38/1,000 live births respectively. Also, the percentage of children with basic vaccination coverage increased from 47% in 1998 to 77% in 2014. Although the percentage of children (i.e. 12-23 months) with low birth weight (less than 2.5kg) is 10%, children under-five who are stunted, wasted or underweight dropped from 35%, 8% and 18% respectively in 2003 to 19%, 5% and 11% respectively in 2014.

The substantial progress made in Ghana's health sector has often been linked to the adoption of Sector Wide Approaches (SWAPs) in Ghana in the 1990s, which ushered in systematic approaches to policy formulation and implementation in Ghana's Health sector. For example, the formulation and implementation of comprehensive and robust medium-term plans (i.e. the Five Year Programme of Works- 5-Year POWs) starting from 1997 to date are all products of the Ghana SWAPs. There have been four 5-Year POWs (i.e. 1997-2001, 2002-2006, 2007-2011 and 2014-2017) since 1997. Most importantly, the POWs meant the formulation of programme specific policies (for example reproductive and child health – RCH) to achieve the objectives of the POWs at the national level.

In Ghana, the Reproductive and Child Health Division (RCHD) of the Ghana Health Service (GHS) is in charge of the development and coordination of the implementation of RCH policies. Over almost two decades, the RCH Division has developed several policies, guidelines and protocols (see Table 3 and Table 4 for full list of policies, guidelines and protocols accessed). What is very clear and unambiguous about the POWs and other programme-specific policies (in this context, RCH policies) in the health sector is the fairly clear, transparent, participatory and robust processes used in their development. On the contrary, the extent to which these policies are informed by existing scientific research evidence is either unclear or has rarely featured in Ghana's health policy literature. The aim of the current situational analysis therefore, is to review the process of knowledge transfer and use of scientific research evidence in the formulation of RCH policies in Ghana. For the purposes of this assignment, RCH is defined to cover maternal, newborn and child health.

2.0   Approach and Methods

The knowledge transfer and innovation diffusion literature abounds in several theoretical frameworks that aim at explaining the process of knowledge transfer and eventual use of knowledge [11, 15-17]. In addition, common sense approaches on how to improve the use of research evidence in the formulation and implementation of policies also abounds, albeit that empirical evidence to support same is lacking in the literature [18]. However, a plethora of frameworks used to explain research evidence uptake [2, 19-23], together with systematic reviews of empirical studies [24-30] undertaken in several high-income countries suggest the following as activities needed to improve the use of scientific evidence to inform policy.

- Capacity of the organisation to use research evidence
- Appropriate collaboration between policy-makers, researchers and stakeholders
- Adequate independence and effective management of conflict of interest
- Use of systematic and transparent methods.

To better understand the process involved in knowledge transfer, a simple framework has recently been developed based on a comprehensive systematic review of the existing knowledge transfer literature [4]. Although the framework has not been empirically tested just as a large chunk of those before it, it appeal comes from the fact that it is recent and tends to combine the components of many of the popular existing frameworks. The core argument of this framework is that knowledge transfer can be disaggregated into five components as below:
1. Problem identification and communication – This deals with channels used by users to communicate problems to researchers.
2. Knowledge/research development and selection – This deals with the knowledge or research to be transferred and the factors that influence the transfer. Key aspect of this component includes the production, synthesising, adaptation and factors that promote the transfer of knowledge produced.
3. Analysis of context – This is part of the knowledge transfer process and look at factors that may constrain or promote the transfer of knowledge.
4. The knowledge transfer activity or intervention – This is often the most common component of the knowledge transfer process and involves the actual activities undertaken to transfer knowledge.
5. Knowledge/research utilisation – This looks at the actual use of knowledge or research findings transferred.

The listing of the components in the current order does not in anyway suggest that they happen in a linear fashion. The proponents of the framework argue that knowledge transfer does not happen in a linear fashion but in a complex, dynamic and multidirectional fashion. However, for simplicity and application to RCH in Ghana, our analysis will be conducted as if the process occurs in a linear form. Thus, the current situational analysis on knowledge transfer and utilization of RCH-related research

evidence is inspired by the above five-component framework, explaining knowledge transfer and research utilization.

Information on the first and third to fifth components (i.e. problem identification and communication, analysis of context, knowledge transfer activity or intervention and knowledge/research utilisation) was gathered through a combination of document review, discussion with senior mangers within the health sector as well as interviews and administration of questionnaire to relevant stakeholders from Ghana's health sector (i.e. mainly policy-makers/managers within the Ministry of Health (MOH) and related agencies. Table 1 below gives details of the information gathering process:

Table 1: Details of information gathering for components of the knowledge transfer process.

Component of Knowledge Transfer	Source of Information
Problem identification and communication	• Discussions within informal networks of persons who are either formally or currently holding policy-relevant positions in the health sector • Interviews granted by participants of the Ghana stakeholders meeting on RCH evidenced-based policy-making in Accra in December 2015.
Analysis of context	• Discussions within informal networks of persons who are either formally or currently holding policy-relevant positions in the health sector • Interviews granted by participants of the Ghana stakeholder meeting on evidenced-based policy making in Accra in December 2015. • Results of questionnaire administered to participants of the Ghana stakeholder meeting on evidenced-based policy making in Accra in December 2015.
Knowledge transfer activity or intervention	• Discussions within informal networks of persons who are either formally or currently holding policy-relevant positions in the health sector • Interviews granted by participants of the Ghana stakeholder meeting on evidenced-based policy making in Accra • Results of questionnaire administered to participants of the Ghana stakeholder meeting on evidenced-based policy making in Accra. • Comments on an earlier version of this report from participants of the Ghana stakeholder meeting on evidenced-based policy making in Accra in December 2015.
Knowledge/research utilisation	• Examination and review of 8 policy documents on RCH and 16 standard protocols and practice guidelines used by the RCH division of GHS. The aim of the review of these documents was mainly to check for evidence that the documents were informed by available scientific evidence. Access to these documents was through a combination of internet search (i.e. through the websites of MOH, GHS,

	various non-governmental organisations (NGOs) in Health in Ghana as well as Google search) and direct request made to managers in the RCH division of GHS.
	• Given that the scaling up of interventions has been suggested as a channel via which knowledge can be translated or transferred [31, 32], a search was conducted both within the published RCH literature on Ghana as well as projects carried out by 3 research centres within GHS, to confirm or otherwise of evidence of scaled up interventions. Published materials were searched through BMC, Elsevier, Oxford and Pubmed using the search criteria "*scaling up reproductive and child health interventions in Ghana*". The search retrieved several papers. However, only those dealing with the scaling up of an RCH intervention in Ghana were selected (see Table 6 for profile and characteristics of papers selected).
	• Discussions within informal networks of persons who are either formally or currently holding policy-relevant positions in the health sector
	• Results of questionnaire administered to participants of the Ghana stakeholder meeting on evidenced-based policy-making in Accra in December 2015.

Information on the second component of the framework (research/knowledge to be transferred) was acquired through discussions with seniors managers within the health sector in addition to review of information provided on the website of the MOH and its agencies, specifically the GHS and related departments. These include the Navrongo Health Research Centre (NHRC), the Kintampo Health Research Centre (KHRC) and the Dodowa Health Research Centre (DHRC). In addition to the information on the websites of the three research centres, the contribution of GHS staff to the reproductive and child health literature on Ghana was also used as evidence to support or otherwise of the capacity of Ghana's health sector to generate the requisite scientific evidence to support policy-making in RCH. To do this, a search through recognised public health-related databases (BMC, Elsevier, Oxford and Pubmed) was carried out in November 2015 using the following search criteria.

a. Knowledge transfer and health policy
b. Evidence informed health policy
c. Evidence and maternal health policy in Ghana
d. Evidence and child health policy in Ghana
e. Evidence and newborn health policy in Ghana
f. Reproductive and child health interventions scale up in Ghana

Based on the above search, papers on reproductive and child health published in English since 2000, with at least 1 author working in the MOH or any of its agencies were selected. A cross-section of the papers selected are contained in Table 3.

3.0   Findings

The findings of this situational analysis is structured around the component of the conceptual framework used for the study as follows.

3.1   Problem identification and Communication

In agreement with the core issues identified under this component, we sought to find out the procedure used to identify RCH research needs and how those needs were communicated to researchers. Discussions with key managers within the health sector as well as informal network of individuals who have once worked in policy positions in the health sector suggest that there is currently no institutional structure either at the level of the MOH or GHS that identifies research needs of units and directorates and channel them to researchers either within the health sector or outside of it.

This notwithstanding, a few units collate their research needs and incorporate it into their annual plans and are carried out when funds are available either through Government of Ghana (GOG) budget or from donor funds. Within the RCH unit for example, the practice has been to aggregate research needs and incorporate it as part of the programme of work for the year, with the actual research carried out when funds become available either through the GOG budget or donor-funded programmes. Besides the above, there are also mechanisms that makes it possible for research needs of the sector to be communicated to donors so that funds are made available to undertake such research or incorporated into the objectives of existing research funded by such donors.

This mixed picture given by the respondents interviewed, seem to be confirmed by the results of two questions [8(iii) and 11(iii) see appendix 1] from the survey carried out during the stakeholders meeting in Accra. The results of question 8(iii) indicates that 71.43% of respondents to the question agree to the existence of a forum/process used to coordinate the setting up of research priorities in the health sector. On the contrary, the results of question 11(iii) indicates that about 60% of respondents believe that their management's participation in fora that discusses research evidence related to organizational goals is inadequate.

It is important however to emphaise that the lack of a structured institutional mechanism within the health sector to identify research needs and communicate same to researchers does not in any way mean that policy-makers are not interested in the use of research evidence to inform policy-making. Respondents suggest that the challenge is rather lack of local funds to carry out research. Indeed, a great proportion of research in Ghana's health sector is funded by donors, whose objectives may not always coincide with the goals of domestic policy-makers. Thus, policy-makers even if interested in a

piece of research, are unlikely to plan for it, given that they are less likely to receive funds domestically to carry out their research.

3.2   Knowledge/research development and selection
3.2.1   Production synthesis and adaptation of knowledge
In line with the theoretical explanation of this component as per the conceptual framework, this section presents existing evidence that can reasonably be used to examine the capacity of the health sector to generate, synthesise and adapt RCH evidence to inform RCH policy. As already indicated, the evidence presented was gathered from the MOH and its associated agencies, specifically the GHS.

Information provided on the website of the GHS in addition to discussion with key managers within GHS suggest that there are currently formal structures in place for ensuring a coherent approach to evidence gathering and synthesis. The GHS has a research and development division (RDD) headed by a director. The division has 3 research centres (Navrongo Health Research Centre, Kintampo Health Research Centre and Dodowa Health Research Centre), in addition to 3 other departments responsible for (1) documentation, dissemination and advocacy (2) ethics and research management and (3) research. As captured on the GHS website, "*the key mandate of the RDD is to generate information through relevant research to strengthen decision making, set health priorities, efficient resource allocation, and inform health intervention planning and implementation in order to deliver better health services to improve health status of the Ghanaian population*"[33].

To confirm that the information above, as captured on the GHS website is operational, a review of the websites of the 3 research centres was carried out. The results from the review of the websites of the 3 research centres indicate extremely impressive activity in terms of completed projects, on-going projects and new projects funded by internationally reputable funding organisations such WHO, ILO, Bill and Melinda Gates Foundation, Rockefeller Foundation, Pfizer Corporation, Volkswagen Foundation, National Institute of Health, World Bank, WAHO and other bilateral and multilateral donors. In addition to the projects, the 3 centres have impressive outputs in the form of peer-reviewed scientific publications from completed projects.

For example, the information on the website of the Dodowa Health Research Centre showed 6 completed projects, 3 on-going projects and 29 peer reviewed scientific publications[34]. In Dodowa, 4 out of a total of 9 projects and 5 out of a total of 29 scientific publications were in the area of reproductive and child health. The Navrongo Health Research Centre on the other hand had 9 new projects, 16 on-going projects, 51 completed projects and 164 peer reviewed scientific publications[35]. Out of a total number of 73 projects in Navrongo, 17 of them were on RCH, with 29 out of a total number of 164 scientific publications being on issues of RCH. The Kintampo Health research Centre had 31 completed projects and 6 on-going projects [36]. Most importantly, issues on maternal, neonatal and childhood health featured strongly in the

projects executed and scientific publications arising from the work of all the 3 research centres.

The output of the research centres is also augmented by a strong health information management system, which collect, process and store data from different clinical and non-clinical institutions within GHS. Discussions with actors within and outside of GHS indicate that output of the health information management system constitute strategic evidence (inputs) into different policies including that of RCH. The health information management system is equally augmented by data from several demographic surveillance systems, in addition to data from nationally representative surveys such as the Ghana Demographic and Health Survey (GDHS) and the Ghana Living Standards Survey (GLSS) conducted every 5 years. Mostly, data from the 3 sources mentioned above are processed and presented in a format that can easily be used by policy-makers.

Besides the work of the research centres, the capacity of actors within GHS (staff and their collaborators) to produce good quality scientific evidence on maternal and child health was also examined. The results (see Table 2) suggest that personnel at different levels of the GHS hierarchy are actively involved in the production of scientific research evidence in the area of reproductive and child health. Authorship of the papers contained in Table 2 equally suggest that staff within GHS are actively collaborating with researchers from different organisation within and outside of Ghana. In addition, evidence that suggest the availability of reproductive and child health research, either synthesised or in raw form that could potentially and readily be used in the formulation of reproductive and child health policy was also examined (see Table 3). Overall, 28 scientific peer reviewed publications were examined, made up of 11 on maternal health, 9 on child health and 8 on neonatal health. Out of the 28 papers, 2 contained evidence based on systematic review of existing literature, 3 on use of evidence in policy-making and 23 on evidence produced based on the evaluation of interventions already in operation. The result is Table 3 is indicative of the existence of extensive evidence on reproductive and child health produced outside of the GHS but available to policy-makers within GHS.

Clearly the sources above point to the fact that the health sector in Ghana has enormous capacity both at the individual and organizational level to produce the much needed evidence for policy formulation. This view is equally supported by results of responses to the questionnaire administered to participants of the Accra stakeholder meeting (see appendix 1). Majority of respondents (as per their answers to different questions that boarder on the capacity of GHS an institution and individuals (staff) therein to carry out good quality research) believe that GHS and its staff have adequate capacity to produce good quality evidence to aid policy-making.

3.2.2 Characteristics of knowledge to be transferred

This sub-section examines issues related to (i) the relative advantage and complexity of the knowledge to be transferred, (ii) compartibility of the knowledge to be transferred with existing beliefs and organizational norms, (iii) How the knowledge to be transferred is aligned to the needs of policy-makers.

In terms of complexity and advantage of the knowledge to be transferred, most of the research outputs found on the websites of the three research institutions are in the form of peer reviewed research papers instead of alternative forms such as policy briefs that can easily be used by policy makers. Although the results of the survey suggest that knowledge of policy briefs and how to use them is widespread in Ghana's health sector, researchers have hardly used such means to disseminate their findings.

Although some respondents during the interview argued that generally, public institutions in Ghana do not have the culture of evidence-based policy making, the case seem to be different in the health sector. The difference may be due to the fact that as compared to other sectors in Ghana, the health sector has a relatively high number of highly qualified and experienced personnel who are also researchers. Thus the use of research evidence in policy-making does not seem foreign to actors in the sector. This is also confirmed by the results of the survey (see Appendix 1) What may however constitute a challenge is the extent to which the available evidence is aligned to the needs of policy-makers. As earlier on indicated and also confirmed by the survey results, a larger proportion of research in the health sector in general, and on RCH in particular, are mostly funded by donors who often have their own objectives which may be different from that of policy-makers. Thus, besides a few circumstances where users of evidence collaborate with donors to conduct research as alluded to above, evidence produced from on-going research may not be aligned to the evidence/knowledge needs of policy-makers.

3.3 Analysis of context

This section deals with identified barriers and incentives to knowledge transfer at the individual, organizational and environment level. As already indicated the sector has some of the most qualified personnel in Ghana's public sector. Most importantly, their individual capacity to conduct research can hardly be questioned as evidenced in the research outputs of the three research centres, in addition to the presence of GHS staff in the RCH literature. Thus it can be argued that at the individual level, the capacity to produced scientific or colloquial research evidence and ability to use that evidence to formulate policies is enormous. In addition, the work environment within the health sector (being a knowledge industry where use of evidence is critical), collaboration with donors who often view evidence as a critical input into decision-making generally makes the health sector an environment that generally has few barriers to the use of research evidence for policy-making. The key challenge in Ghana however is (i) how to ensure that research in general and for that matter health related research get the right attention at the highest level of political and administrative leadership so that it attracts

the right level of funding, (2) the lack of a robust and comprehensive institutional structures that ensures that the numerous health sector-related research being carried out (i.e. whether specifically related to RCH or other relevant health issues) are aligned to the needs of policy makers. This position seem to be confirmed by the results of the survey where respondents seem to suggest that institutional level incentives for carrying out research is inadequate, albeit that at the individual level, the required capacity and willingness exist to carry out good quality research.

3.4 Knowledge transfer activities or interventions

As indicated in the framework, this aspect of the process looks at actual interventions put in place to facilitate/ensure the transfer of knowledge/evidence for the purposes of policy-making. In the context of Ghana's health sector, the most common intervention is post research dissemination workshops/conferences. In few instances, targeted policy briefs from completed research are disseminated to key stakeholders. However, as already indicated based on evidence from the three research centres, the use of policy briefs as a tool for ensuring the uptake of research evidence into policy in general and RCH in particular is rather scarce. The evidence gathered also suggest that advocacy by researchers as well as dialogue between donors and policy-makers constitute some of the channels via which research evidence on some key policy issues are discussed and consensus reached on the possibility of adopting such evidence to aid policy formulation. The survey results suggest that there are inadequate research evidence implementation committees in the health sector, constrained capacity to present research evidence in concise and accessible languages and constrained capacity to synthesise different research evidence that addresses a common problem into a single document that could be attractive to policy-makers

3.5 Knowledge/research utilisation

This component of the knowledge transfer process looks at the actual use of available evidence in the formulation of policies. Following from the evidence gathered, we examined the level and extent to which the extensive evidence available, both within and outside of the GHS is used in the formulation of policies and guidelines. Thus, 8 policy documents (6 on maternal health, 1 on child health and 1 on newborn health) were accessed and reviewed (see Table 3) with the aim of identifying whether the contents were informed by existing scientific evidence. The findings indicate that 3 out of the 8 policy documents reviewed show that an evidence-based approach was used (i.e. either through citation of scientific research publications, synthesis of research evidence from the academic literature and adaptation of benchmarks from key policy and professional organisations such as the World Health Organisation- WHO) in developing the document. In addition to the policies, 15 standard protocols and practice guidelines (See Table 5) covering maternal and adolescent health (11), neonatal and child health (1), general infection prevention and control (1) and malaria prevention (2) were also reviewed. Out of the 15 protocols and practice guidelines, 5 of them were evidence-informed. Surprisingly however, the policy documents and practice guidelines that suggest the use of scientific evidence did not explain the evidence

generation processes and how the evidence was used in the policy/practice guidelines documents. What is however clear, is the fact that the 8 policy documents and 15 protocols and practice guidelines were all developed through a consultative and participatory approach mostly involving stakeholders and professionals knowledgeable in a particular subject area. It is also important to state that discussions with key managers within the RCH division of the GHS indicated that almost all the standard protocols and practice guidelines in use are adaptations from regulators or key institutions (WHO, UNICEF, UNFPA World Bank etc), that are known to rely heavily on scientific evidence in the production of such guidelines.

In addition to the review of the policies and practice guidelines, another channel via which knowledge translation may occur (i.e. scaling up of interventions based on evidence from a pilot phase) [31, 32] was also examined. The results (see Table 6) show 10 very important and key interventions that were scaled-up based on evidence from the pilot/experiment phase. A key intervention in this direction is the Navrongo experiment (i.e. the Community Health Planning and Services – CHPS concept). Lessons learnt from the Navrongo experiment was crucial to the scaling up of the CHPS concept, which currently constitute a key Safe Motherhood strategy in Ghana. At the moment, plans are far advanced to scale up the use of capitation as a payment method across the country after initial piloting in the Ashanti region of the country. There is also evidence to the effect that the decision to discontinue vitamin A on pregnant women was based on a research that found out that it did not have any effect on pregnant women. Again it is on record that the Emergency Obstetric, Maternal and New Born Care study in Ghana informed GHS' adoption of the maternal acceleration fund policy to facilitate maternal and newborn care in 2011. Also evidence from the EMBRACE study is currently being used by GHS to adopt a special maternal card, which helps in tracking the progress of pregnant women so that they can adhere to their continuum of care. Information from the DHRC also suggest the use of research evidence to support health policy. For example, project briefs from the DHRC shows policy impact in terms of level of policy-making, type of policy, nature of policy impact, policy networks, political capital and inclusion in policy documents.

From the foregoing one can argue that although a structured and robust organizational mechanism does not exist to ensure the use of scientific research evidence to inform policy formulation, actors within the health sector are relying on existing albeit weak institutional platforms to transfer knowledge gained from research.

4.0   Discussion
This section discusses the findings above and uses that to answer the key question of whether Ghana's health sector has institutional structures in place for the production of evidence and the linking of same to inform policy formulation in general and RCH policies in particular?

The findings above suggest that there are currently organizational-wide structures in place for the production of RCH evidence that can be used to support the formulation of RCH policies. This is based on the fact that GHS has a well functioning research and development division that is extremely active as evidenced by the number of projects undertaken as well as the peer reviewed scientific research publication carried out. The fact that most of the research projects carried out by the research centres are funded by internationally reputable funding organisations such WHO, ILO, Bill and Melinda Gates Foundation, Rockefeller Foundation, Pfizer Corporation, Volkswagen Foundation, National Institute of Health, World Bank, WAHO and other bilateral and multilateral donors, speaks to the quality of their research output. Besides the output of the research centres, the findings indicates that staff from within GHS are very active contributors to the RCH literature on Ghana. Again the existence organizational and national level data repositories that can easily be accessed and used by policy-makers to aid policy formulation is ample testimony of the existence of high quality scientific research evidence that can be used to inform policy formulation. Also, the findings suggest that both GHS staff and other external collaborators carry out scientific research within GHS. Thus, the findings points to a certain systematic approach at the organizational level to enhance the production of evidence through scientific research.

Besides the capacity to carry out scientific research, the evidence gathered in this situational analysis also suggest that enough incentives both at the individual and organizational levels exist to promote the use of evidence in the formulation of policies. It is however important to emphasise that the inability to link organizational goals and priorities to on-going and future research as well as the inability to secure adequate funding domestically at the highest decision-making level in the health sector constitute a major challenge in promoting the evidence-based policy agenda in Ghana's health sector. There are actors who believe that improving the system of evidence-based policy making should commence with a buy-in and relevant support from the highest level of political and administrative decision-making and should reflect not only in promises but also commitment to support such promises with dedicated budget for research.

On the contrary, the answer to the question of whether actors within the GHS have the capacity to use available evidence on RCH to influence RCH policy is not straightforward. One set of evidence point to the fact that systematic organizational structures as well as individual capacity that makes it relatively easy for policy-makers to use available evidence in the formulation of RCH policies exist. For example, project reports that capture the details (level of policy-making, type of policy, nature of policy impact, policy networks, political capital and inclusion in policy documents) of how findings of executed projects have been used in the formulation of policies is instructive. The fact that almost all the standard protocols and practice guidelines are adaptations from benchmark documents issued by regulators or key institutions such as WHO, UNICEF, UNFPA World Bank who rely a lot on scientific evidence in the production of such guidelines is instructive. Thus, modeling RCH protocols and

guidelines around documents of such institutions is ample evidence to the fact the protocols and practice guidelines are informed by evidence.

Also evidence on the scaling up of RCH interventions based on lessons from the pilot or initial phase is ample testimony that scientific research evidence gathered from project execution constitutes a relevant input to policy formulation and implementation. As already indicated, the scaling up of the Navrongo experiment (i.e. the CHPS concept) has had and will continue to have a profound impact on the nature and type of strategies adopted to improve reproductive and child health outcomes in Ghana. The scaling up of capitation as a payment mechanism for Ghana's social health insurance from one region/province to cover the entire country is also important in this direction. Also the referencing of scientific research papers in the bibliography section of some of the policies and standard protocols and practice guidelines is suggestive that evidence from such papers constituted a good piece of evidence used in the formulation of the respective policies. On account of this evidence, one can safely conclude that capacity exist within GHS that enables that available scientific research evidence is used to aid the formulation and implementation of RCH policies.

Notwithstanding the above, there are findings from the situational analysis that is likely to make one conclude that GHS lacks capacity to use available RCH evidence to aid the formulation of policies. For example, several of the policy documents and standard protocols and practice guidelines did not have any scientific research publication acknowledged in the list of references. As per Table 4, only 3 out of the 8 policy documents reviewed cited scientific research papers. In the case of the standard protocols and practice guidelines (see table 5), only 5 out of the 15 documents reviewed cited the use of a scientific research paper. Even more important is the fact that those documents that cited scientific research papers did not explain the processes via which evidence emanating from these scientific papers were captured and used to in either policy formulation or drafting of the standard protocols and practice guidelines. Equally important in this regard is the apparent lack of both physical and electronic evidence that shows that findings from the numerous completed projects as well as peer reviewed publications have been converted to a form that can easily be used by policy makers (e.g. policy briefs or policy summaries).

I argue that it is appropriate to interpret these as structural weaknesses within MOH and its agencies, specifically GHS that constrain the use of evidence to inform policy formulation and not necessarily evidence that policies and guidelines are not informed by existing evidence. As earlier indicated, staff within Ghana's health sector, notwithstanding the exiting constraints are impressively conducting research and not surprisingly a lot of clinical policies implemented are the results of such research as also indicated above.

Notwithstanding the above interpretation, what seem to be clear from the evidence gathered so far with respect to the management of knowledge transfer processes in

Ghana's health sector and for that matter RCH is that apart from the actual knowledge production component, the rest of the process seem to be rather informal. For example, the key components of problem identification and communication, implementation of interventions and actual use of evidence does not follow any structured institutional system. Additionally, funding for research is not centrally coordinated but mostly an arrangement between individual or cluster of researchers within the health system and donors. It is important to emphasise that these weaknesses, collectively have negative implications for establishing an appropriate monitoring and evaluation framework to evaluate the knowledge production process and how it is impacting on policy formulation. It is therefore not surprising that key performance indicators (KPIs) used to evaluate sector-wide performance does not capture knowledge production and transfer as an activity of interest to monitor.

5.0   Strength, Weaknesses, Opportunities and Threats
A careful examination of the findings of the current situational analysis suggest that Ghana, compared to many Sub-Saharan African countries has made progress in producing evidence and using same to inform policy formulation. It is therefore important that the strength of the existing system is highlighted and appropriate measures instituted to deal with inherent weaknesses and threats so as be able to take advantage of current and future opportunities to improve exiting knowledge transfer processes in the health sector.

5.1   Strengths and Weaknesses
Findings from the current situational analysis is suggestive that within Ghana's health sector and for that matter the RCH division of GHS, policy formulation is evidenced-based. There is also enough evidence to suggest that GHS has in place organisational level structures (the 3 research centres), to aid the production of the requisite evidence to be used for policy formulation. Also important is the fact that GHS has a critical mass of researchers within its fold who are extremely active in contributing to the production of scientific knowledge in the area of reproductive and child health. These indeed, constitute massive organizational capabilities and strength that could be leveraged upon to further improve the capacity of GHS in general and the RCH division in particular to produce and use scientific research evidence in the formulation of RCH policies and guidelines. Additionally, the fact that existing norms and beliefs within the health sector is consistent with knowledge production and transfer is important for improving the practice of evidence-informed policy and practice.

Notwithstanding the strengths enumerated above, the general inability to convert most of the several scientific publications by the three research centres into policy friendly summaries or briefs, coupled with the absence of appropriate scientific references in most of the policy documents and practice guidelines is indicative of internal administrative weaknesses. These weaknesses refer to systematic structures that ensure that best practices are defined and followed. Given that the standard protocols and practice guidelines are adaptation as earlier indicated, one will expect that the main

document on which they are based are adequately cited, the processes via which evidence contained in the main material was synthesized and used also transparently acknowledged and referred to in the new document.

Again the absence of a central structure from within the health sector to coordinate the key knowledge production and transfer actors (policy-makers, researchers and donors) as well as the absence of a structured approach to defining research needs and linking same to on-going research constitute a huge weakness in the system. Additionally, the fact that knowledge utilization processes are not transparently defined and incorporated into organizational systems within the sector is also problematic. It is also important to point out that the absence of an effective monitoring and evaluation function for knowledge production and transfer constitute a system weakness.

5.2   Opportunities and Threats

Outside of the internal structures, there are clear opportunities that can be exploited by GHS to improve on its uptake of scientific research evidence as inputs to the policy formulation process. For example, the extensive network of collaborations in terms of working with researchers outside of GHS, access to major financiers (WHO, ILO, Bill and Melinda Gates Foundation, Rockefeller Foundation, Pfizer Corporation, Volkswagen Foundation, National Institute of Health, World Bank, WAHO and other bilateral and multilateral donors) of scientific research are all great opportunities that can be exploited to improve internal structures for producing and using good quality evidence to inform policy formulation and implementation. It is however important to emphasise that to be able to take advantage of the opportunities enumerated, a major threat that ought to be managed well is the issue of funding. Issues around nature and source of funding are crucial and most importantly how funding for research is coordinated and managed. The fact that a larger proportion of funding for research in the health sector comes from outside the health sector budget is a threat to implementing any robust central coordinating mechanism for knowledge production and transfer.

Thus it is important that as Ghana's strengths and opportunities for knowledge production and transfer are highlighted, effective and immediate steps are taken to address inherent weaknesses and threat to ensure that it improves on the current system of producing evidence and using same to inform the formulation of policies. As clearly articulated by the participants of the Accra stakeholder meeting, improving the knowledge transfer process is a collective task that must involve all stakeholders (key among them being researchers, policy-makers and donors) with the health sector supposed to take the lead.

6.0   Conclusion

Issues of reproductive and child health (i.e. maternal child and neonatal health) are important areas for strengthening health systems in developed and developing countries alike. In developing countries such as Ghana, the issue is even much critical given that health systems are generally weak coupled with low levels of investments. Health

indicators in general and reproductive and child health indicators in particular were poor in the 1990s. However, the implementation of pragmatic policies and commitment of the managers of the health sector over almost two decades has "paid off" in terms of tremendous improvement in the state of reproductive and child health as earlier emphasized.

It is important to reiterate that although current reproductive and child health indicators in Ghana compares unfavourably to similar developing countries (Paraguay, Chile, Costa Rica and Uruguay) in Latin America and the Caribbean, it remains one of the best in Sub-Saharan Africa. Clearly, policies that have been implemented over the last two decades have yielded good results. Extra efforts to improve RCH policy-making processes are likely to yield even much higher results. It is therefore important that MOH and its agencies, especially GHS, takes advantage of its current strengths and opportunities (strong knowledge production capacity, access to knowledge production networks, a positive environment for the promotion of evidence informed-policy, access to major donors who have the resources to fund good quality research etc.) to confront and address the structural and organizational weaknesses inherent in the process for translating research evidence to evidenced-informed policy.

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104.	Ghana Health Service: **Report on the Burden of Obstetric Fistula in Ghana**. In. Ghana: Ghana Health Service 2015.

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106.	Ministry of Health: **Anti-Malaria Drug Policy for Ghana**. In. Accra, Ghana: Ministry of Health; 2007.

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Table 2: Profile and Characteristics of Scientific Contributions of Staff from MOH/GHS and Related Agencies

	Authors	Author of interest	Title of paper	Place of work	Name of Journal
1.	Ganyaglo, G. Y.K. and Hill, W. C. 2012[37]	Gabriel Y.K. Ganyaglo	A 6-Year (2004-2009) review of maternal mortality at the Eastern Regional Hospital, Koforidua, Ghana	Department of Obstetrics and Gynaecology, Korle Bu Teaching Hospital, Korle-Bu, Accra, Ghana	Seminers In Perinatology
2.	Orish et al. 2012 [38]	Verner N. Orish	Adolescent pregnancy and the risk of Plasmodium falciparum malaria and anaemia—A pilot study from Sekondi-Takoradi metropolis, Ghana	1.Department of Internal Medicine, Effia-Nkwanta Regional Hospital Sekondi-Takoradi, Sekondi, Western Region, Ghana	Acta Tropica
3.	Ö Tunçalp et al. 2013 [39]	Kwame Adu-Bonsaffoh	Assessment of maternal near-miss and quality of care in a hospital-based study in Accra, Ghana	Department of Obstetrics and Gynaecology, Korle-Bu Teaching Hospital	International Journal of Gynecology and Obstetrics
4.	Abdullah et al. 2011 [40]	Francis Abantanga, Elias Sory Hayley Osen	Assessment of surgical and obstetrical care at 10 district hospitals in Ghana using on-site interviews	Department of Surgery, Korle Bu Teaching Hospital, Accra, Department of Surgery, Komfo Anokye Teaching Hospital, Kumasi, Ghana Ghana Health Services, Accra, Ghana	Journal of Surgical Research
5.	Asundep et al. 2013 [41]	Cornelius Archer Turpin	Determinants of access to antenatal care and birth outcomes in Kumasi, Ghana	Komfo Anokye Teaching Hospital, Kumasi, Ghana	Journal of Epidemiology and Global Health
6.	Kirkwood et al. 2010 [42]	S Amenga-Etego C Tawiah C Zandoh , S Danso S Owusu-Agyei, P Arthur	Effect of vitamin A supplementation in women of reproductive age on maternal survival in Ghana (ObaapaVitA): A cluster-randomised, placebo-controlled trial	Kintampo Health Research Centre, Ministry of Health, Kintampo, Ghana	Lancet
7.	Dassah et al. 2015 [43]	Edward T. Dassah Yaw Adu-Sarkodie	Estimating the uptake of maternal syphilis screening and other antenatal interventions	Department of Obstetrics and Gynecology, Komfo Anokye Teaching Hospital, Kumasi, Ghana	International Journal of Gynecology and Obstetrics

			before and after national rollout of syphilis point-of-care testing in Ghana		
8.	Rominski et al. 2014 [44]	1.Raymond Aborigo 2.Abraham Hodgson	Female autonomy and reported abortion-seeking in Ghana, West Africa	.Navrongo Health Research Centre, Ghana Health Service, Navrongo, Ghana Ghana Health Service, Accra, Ghana	International Journal of Gynecology and Obstetrics
9.	Hussein et al. 2005 [45]	1.Mercy Abbey	How do women identify health professionals at birth in Ghana?	1Ghana Health Service, Health Research Unit, Republic of Ghana	Midwifery
10.	Geynisman et al. 2011 [46]	Anthony Ofosu	Improving maternal mortality reporting at the community level with a 4-question modified reproductive age mortality survey (RAMOS)	Ghana Health Service and Ministry of Health, Accra, Ghana	International Journal of Gynecology and Obstetrics
11.	Morhe et al. 2012 [47]	Emmanuel S.K. Morhe Frank K. Ankobea Kwabena A. Danso	Reproductive experiences of teenagers in the Ejisu-Juabeng district of Ghana.	Department of Obstetrics and Gynecology, Komfo Anokye Teaching Hospital, Kumasi, Ghana	International Journal of Gynecology and Obstetrics
12.	Okiwelu et al. 2007 [48]	Daniel Arhinful Margaret Armar-Klemesu	Safe motherhood in Ghana: Still on the agenda?	Noguchi Memorial Institute for Medical Research, University of Ghana, Ghana	Health Policy
13.	Witter et al. 2007 [49]	Sawudatu Zakariah-Akoto	The experience of Ghana in implementing a user fee exemption policy to provide free delivery care	Researcher, IMMPACT, Noguchi Memorial Institute of Medical Research, University of Ghana	Reproductive Health Matters
14.	Subramanian et al. 2010 [50]	Nicholas Kanlisi	The Ghana vasectomy initiative: Facilitating client–provider communication on no-scalpel vasectomy	Ghana R3M Project, EngenderHealth, Accra, Ghana	Patient Education and Counseling
15.	Ako and Akweongo. 2009 [51]	Matilda Aberese Ako, Patricia Akweongob	The limited effectiveness of legislation against female genital mutilation and the role of community beliefs in Upper East Region, Ghana	Research Fellow, Navrongo Health Research Centre, Navrongo, Upper East Region, Ghana	Reproductive Health Matters

16.	Moyer et al. 2014 [52]	Raymond A. Aborigo Abraham Hodgson,	'They treat you like you are not a human being': Maltreatment during labour and delivery in rural northern Ghana	Navrongo Health Research Centre, Navrongo UE/R, Ghana	Midwifery
17.	Masters et al. 2013 [53]	1. George Amofah 2. Patrick Abaogye	Travel time to maternity care and its effect on utilization in rural Ghana: A multilevel analysis	Ghana Health Service, Kumasi, Ghana. Reproductive and Child Health Dept., Family Health Division, Ghana Health Service, Accra, Ghana	Social Science & Medicine
18.	Baiden et al. 2006 [54]	F. Baiden, R. Baiden, and Hodgson, A.R. Oduro, K. Amponsa-Achiano, T.A. Mensahc,	Unmet need for essential obstetric services in a rural district in northern Ghana: Complications of unsafe abortions remain a major cause of mortality	1.Navrongo Health Research Centre, Navrongo, UER, Ghana 2.Department of Obstetrics and Gynaecology, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana 3.War Memorial Hospital, Navrongo, Upper East Region, Ghana	Public Health
19.	Powell-Jackson et al. 2014[55]	Evelyn K. Ansah	Who benefits from free healthcare? Evidence from a randomized experiment in Ghana	Research and Development Division, Ghana Health Service, Ghana	Journal of Development Economics
20.	Sinclair et al. 2013 [56]	Martha Gyansa-Lutterodt, Brian Asare, Augustina Koduah,	Integrating global and national knowledge to select medicines for children: The Ghana national drugs programme	Ghana National Drugs Programme, Accra, Ghana,	Plosmedicine
21.	Dassah et al. 2015 [57]	Edward Tieru Dassah Yaw Adu-Sarkodie	Factors associated with failure to screen for syphilis during antenatal care in Ghana: a case control study	Department of Obstetrics and Gynaecology, Komfo Anokye Teaching Hospital, Kumasi, Ghana	BMC Infectious Diseases
22.	Cofie et al. 2015 [58]	Sodzi Sodzi-Tettey	Birth location preferences of mothers and fathers in rural Ghana: Implications for pregnancy, labor and birth outcomes	Project Fives Alive!/Institute for Healthcare Improvement, Accra, Ghana	BMC Pregnancy and Childbirth

23.	Atuahene et al. 2013 [59]	David Mensah and Martin Adjuik	A cross-sectional study of determinants of birth weight of neonates in the Greater Accra region of Ghana	National Malaria Control Programme, Accra, Ghana. 3INDEPTH Network Secretariat, Accra, Ghana.	Maternal Health, Neonatology, and Perinatology
24.	Nakua et al. 2015 [60]	Justice Thomas Sevugu	Home birth without skilled attendants despite millennium villages project intervention in Ghana: Insight from a survey of women's perceptions of skilled obstetric care	1Sekyere-Kumawu Health Directorate, Kumasi, Ghana.	Pregnancy and Childbirth
25.	Dalaba et al. 2015 [61]	Maxwell A Dalaba Raymond A Aborigo John Williams Gifty A Aninany	Cost to households in treating maternal complications in northern Ghana: a cross sectional study	Navrongo Health Research Centre, Navrongo, Ghana	Health Services Research
26.	Manu et al. 2015 [62]	Gloria Quansah Asare, Kwasi Odoi-Agyarko	Parent–child communication about sexual and reproductive health: evidence from the Brong Ahafo region, Ghana	Family Health Division, Ghana Health Service, Private Mail Bag, Ministries, Accra, Ghana. RHI Medical Centre, Amanokrom, P.O. Box 134, Mampong-Akuapem, Eastern Region, Ghana	Reproductive Health
27.	Achana et al. 2015 [63]	Fabian Sebastian Achana, Paul Welaga, Timothy Awine and Abraham Oduro John Koku Awoonor-Williams	Spatial and socio-demographic determinants of contraceptive use in the Upper East region of Ghana	Navrongo Health Research Centre, Navrongo, Upper East Region, Ghana. Regional Health Directorate, Ghana Health Service PMB,Upper East Region, Bolgatanga, Ghana.	Reproductive Health
28.	Adjei et al. 2015 [64]	1.Kwame K. Adjei, Martha A. Abdulai, Sam Newton, and Seth Owusu-Agyei	A comparative study on the availability of modern contraceptives in public and private health facilities in a peri-urban community in Ghana	Kintampo Health Research Centre, Ghana Health Service, Kintampo, Ghana.	Reproductive Health

		2. Sam Adjei4		Centre for Health and Social Services, Accra, Ghana	
29.	Amoakoh-Coleman et al. 2015 [65]	Charles Brown-Davies Kerstin Klipstein-Grobusch	Completeness and accuracy of data transfer of routine maternal health services data in the Greater Accra region	Ghana Health Service, Greater Accra Region, Accra, Ghana. Research and Development Division, Ghana Health Service, Accra, Ghana	Research Notes
30.	Hall et al. 2015 [66]	Kwabena Danso	A retrospective analysis of the impact of an obstetrician on delivery and care outcomes at four district hospitals in Ghana	Ghana Health Service, Sekyere Kumawu District Health Directorate, Kumawu, Ghana	International Journal of Gynecology and Obstetrics
31.	Bawah et al. 2009 [67]	Ayaga Bawah	"The impact of immunization on the association between poverty and child survival: Evidence from Kassena-Nankana district of Northern Ghana".	The INDEPTH Network	Scandinavian Journal of Public Health,
32.	Adongo et al. 1997 [68]	Adongo B. Philip	Cutural Factor Constraining the introduction of Family planning amogn the Kassena-Nankana district of Northern Ghana	'Navrongo Health Research Centre, Ministry of Health, Navrongo	Social Science & Medicine
33.	Amoakohene et al. 2004 [69]	Amoakohene	"Violence against women in Ghana: a look at women's perceptions and review of policy and social responses.	Ghana Health Service	Social Science & Medicine
34.	Witter et al. 2009 [70]	Margaret Armar-Klemesu	Providing free maternal health care: ten lessons from an evaluation of the national delivery exemption policy in Ghana	Noguchi Memorial Institute for Medical Research, Accra, Ghana	Ghana Global Health Action
35.	Oppong et al. 2015 [71]	Samuel A. Oppong, Michael Y. Ntumy, Mary Amoakoh-Coleman, Deda Ogum-Alangea, Emefa Modey-Amoah	Gestational diabetes mellitus among women attending prenatal care at Korle-Bu Teaching Hospital, Accra, Ghana	Ghana Health Service, Accra	International Journal of Gynecology and Obstetrics
36.	Obrist et al. 2014 [72]	Ernest Osei-Bonsu, Baffour Awuah	Factors related to incomplete treatment of breast cancer in Kumasi,	Komfo Anokye Teaching Hospital, Department of Medical Oncology and	The breast

				Ghana	Radiation, & Central Administration, Kumasi, Ghana	
37.	Shelus et al. 2015 [73]	Stephen Mensah, Kafui Dzasi	Lessons from a geospatial analysis of depotmedroxyprogesterone acetate sales by licensed chemical sellers in Ghana	Global Health Population and Nutrition, Accra, Ghana	International Journal of Gynecology and Obstetrics
38.	Sukums et al. 2015 [74]	Nathan Mensah, Afua Williams	Promising adoption of an electronic clinical decision support system for antenatal and intrapartum care in rural primary healthcare facilities in sub-Saharan Africa: The QUALMAT experience	Navrongo Health Research Centre, Navrongo, Ghana	International journal of medical informatics
39.	Aborigo et al. 2015 [75]	Akawire Aborigo	The traditional healer in obstetric care: A persistent wasted opportunity in maternal health	Navrongo Health Research Centre, Navrongo, Ghana	Social Science & Medicine

Table 3: Profile and Characteristics of Available Evidence Outside of MOH/GHS that can be used to Inform RCH Policy in Ghana

S/No	Author/year of publication/ reference	Category of intervention	Health issue of intervention	Evidence-generated	Policy relevant conclusion
			PAPERS ON MATERNAL HEALTH		
1.	de Souza 2009 [76]	Evaluation of evidence-based approaches to decision-making.	Inclusion of geographic information systems (GIS) as part of Ghana's health information systems	GIS health applications in Ghana are few, with little or perhaps no effects on policy and decision-making. Including GIS as part of Health Information Systems can go a long way in promoting the generation and use of evidence for decision-making, program development, resource allocation and surveillance systems.	A strong collaboration between academics in the area of GIS and health professionals in the Ghana Health Service will be key to advancing health-based GIS
2.	Awusabo-Asare et al. 2004 [77]	Research evidence on adolescent sexual and reproductive health	A synthesis of research evidence on adolescent sexual and reproductive health.	Evidence suggest a sizeable gap between the age at first sex and the age at first marriage: Generally, first sexual intercourse happens about 2 years before first marriage for young women, with young men taking place about 5 years before first marriage.	Notwithstanding that young people are aware of the existence of different methods of contraceptive, including male, condoms usage remains relatively low, with access to health information and services for young people being uneven.
3.	Croce-Galis 2004	Evidence on sexual and reproductive health.	Documents what is known about Ghanaian adolescents' sexual and reproductive health	There is a lack of information about the implementation, monitoring and, most importantly, the evaluation of interventions aimed at improving the	Additional evidence is required to explain the gap between awareness of sexual and reproductive health services and actual use of such services as well as information about the implementation, monitoring and,

			behaviors and needs, with particular emphasis on HIV/AIDS	sexual and reproductive health of Ghanaian youth.	most importantly, the evaluation of interventions aimed at improving the sexual and reproductive health
4.	Baker et al. 2012 [78]	Promotion of MHC intervention which is already operational	Understanding how to increase CPGs' potential to improve quality of care for mothers in three SSA countries including Ghana.	The study suggests very little variance between national guidelines for maternal health and WHO recommendations. This is not withstanding the that use of CPGs in practice was perceived to be limited	There is need to prioritize the format of guidelines to increase their usability and applicability and to consider these attributes together with implementation as integral to their development processes. The prioritization of the format of guidelines will improve applicability and usability. In addition,
5.	Mayhew 2000 [79]	Evaluation of a range of policies developed for STI management.	Integrating STI services in family planning (FP)/maternal and child health (MCH) services.	The paper suggests that a 'blanket' policy to integrate STl and FP/MCH services may be inappropriate in particular contexts. The implementation of health policies is influenced – and often impeded not only **by local** service contexts, economic and epidemiological factors but also by culturally defined social attitudes and behaviours.	Enhancing at district level, the voice of nurses working at the community level, and promoting collaborative, culturally specific and community-based initiatives could facilitate addressing the issues.
6.	Ganyaglo and Hill 2012 [37]	Review of issues on maternal mortality	A 6-year review of maternal mortality	The study revealed that the highest number of deaths was recorded in the period following termination of pregnancy (abortion or delivery).	Referral of patients to hospital on a timely basis could be important for reducing preventable maternal deaths
7.	Darteh et al. 2014 [80]	Decision making in RH.	Examination of factors that influence the decision to engaging in sexual intercourse and use of condom among women	Women who were in the richest, rich and middle wealth index quintiles were more likely to make decisions to engage in sexual intercourse as well as use condoms compared to the poorest. Additionally, women with some level of education, were more likely to make	Interventions and policies aimed at empowering women to take control of their reproductive health should target women from less wealthy backgrounds and those with low educational attainments.

				decisions on sexual intercourse than those with no formal education.	
8.	Sundaram et al. 2014 [81]	Evaluation of MHC intervention already in operation.	Examination of whether the R3m program made a difference to the provision of safe abortion services and post abortion care (PAC). Also examine the role played by provider attitudes and knowledge of the abortion law, on providers with clinical training in service provision	Associations between provider attitudes and knowledge of the law on both outcomes were either non-significant or inconsistent including for providers with clinical knowledge of abortion provision. Provider confidence however is strongly associated with service provision.	The R3M programme is important for safe abortion provision. Increased provider confidence is crucial to improving both safe abortion provision and PAC.
9.	Reichenbach 2002 [82]	Evaluation of the politics of priority setting in RH	Examines the influence of political and organizational factors on national priority setting for reproductive health	Traditional priority setting methods cannot explain the priority given to breast cancer in Ghana. It demonstrates how local politics can trump scientific and economic evidence and suggests that the priority setting process can have unforeseen equity and social implications.	The policy priority measure provides a more complete picture of reproductive health priorities and is useful for better understanding of the implications of the priority setting process for reproductive health.
10.	Amoako et al. 2015 [83]	Evaluation of MHC intervention already in operation	Investigated the impact of maternity-related fee payment policies on the uptake of skilled birth care amongst the poor in Ghana.	The rich–poor gap in skilled birth care use was highly pronounced during the 'cash and carry' and 'free antenatal care' policies period. The benefits during the 'free delivery care' and 'NHIS' policy periods accrued more for the rich than the poor.	The maternal care fee exemption policies specifically targeted towards the poorest women had limited impact on the uptake of skilled birth care.

11.	Twum-Danso et al. 2014 [84]	Evaluated MHC intervention already in operational	Test the feasibility and effectiveness of the new early post-natal care (PNC) policy and its subsequent scale-up throughout northern Ghana.	There is a slower increase in skilled delivery over a longer period of time. The early PNC policy was scaled up over the subsequent 2 years to 576 health facilities in all 38 districts of northern Ghana.	The study provides a model for improving the implementation of other national health policies to accelerate the achievement of the Millennium Development Goals in Ghana and other resource-poor countries.
			PAPERS ON CHILD HEALTH		
1	Friedman et al. 2015 [85]	Evaluated CH intervention already in operation.	Using SMS from licensed chemical sellers (LCS) in Ghana to recommend the use of ORS and zinc for the management of childhood diarrhea	Using SMS intervention, providers self-reported practices improved but not their actual practices.	Actual practices vary considerably from reported practices.
2	Tawiah-Agyemang et al. 2008 [86]	Evaluated a CH intervention already operational	Probed the reason why women in Ghana initiate breast-feeding early or late, who advices on initiation and what foods or fluids are given to babies when breast-feeding initiation is late.	Facilitating factors that aided for early inception included delivery in a health facility, where the staff encouraged early breast-feeding, and the belief in some ethnic groups that putting the baby to the breast encourages the flow of milk.	Raising awareness on early initiation of breastfeeding in the communities and the policy arena is crucial with interventions focusing on finding solutions to barriers to early initiation with a community component.
3	Edmond et al. 2007 [87]	Evaluated a CH intervention already operational	Looked at early infant feeding practices and it's effect on infection-specific neonatal mortality in breastfed neonates aged 2–28 d.	No clear associations were seen between these feeding practices and noninfection-specific mortality. Prelacteal feeding was not associated with infection or noninfection-specific mortality.	This study gives the first epidemiologic proof of a causal association between early breastfeeding and reduced infection-specific neonatal mortality in young human infants.

4	Manu et al. 2014 [88]	Evaluated a CH intervention already implemented	Evaluation of community volunteer assessment and referral implemented within the Ghana Newhints home visits cluster-Randomized Controlled Trial (RCT).	In resource-constrained settings, community volunteers can be successfully used to identify through assessment and refer of sick newborn to health facilities as recommended in the WHO/UNICEF joint statement on home visits in 2009.	Isolated community interventions will have limited impact unless coupled with concurrent improvement of quality within health facilities.
5	Adongo et al. 2005 [89]	Use of health Knowledge in policy.	Explored how local community knowledge about malaria acts as a barrier to the use of ITNs in three settings.	People recognize the term 'malaria' but have limited biomedical knowledge of the disease, including its aetiology, the role of the vector, and host response. Convulsions and anaemia are rarely linked to malaria	Simply informing communities that mosquitoes cause malaria does not appeal to people; health education needs to move beyond that and inform people why it is the mosquito that causes malaria and not other insects.
6	Nyarko et al. 2001 [90]	Immunisation status and child survival.	Examine the influence of immunization coverage on all-cause child mortality in Kassena-Nankana District of northern Ghana.	Children who have received no immunizations are at substantially higher risk of death through approximately the first year of life than those who have some vaccination coverage, whether complete or incomplete.	There is the need for further research on the all-cause mortality impact associated with these vaccines in developing countries.
7	Singh et al. 2013 [91]	Impact evaluation of MCH intervention already in operational	Evaluate the influence of the early phase of Project Fives Alive! a national child survival improvement project, on key maternal and child health outcomes.	There was an association between the early pregnancy identification change category with increased skilled delivery. Also a greater number of change categories tested was associated with increased skilled delivery.	The QI approach of testing and implementing simple and low cost locally inspired changes has the potential to lead to improved health outcomes at scale both in Ghana and other low- and middle-income countries.
8	Vance et al. 2014 [92]	Implemented a RH intervention to improve CH.	Determined whether integrating family planning (FP) messages	Reported referrals to FP services did not improve nor did women's knowledge of factors related to return of fecundity	Rigorous evidence of the success of integrated immunization services in resource poor settings remains weak.

			and referrals into facility-based, child immunization services increase contraceptive uptake in the 9- to 12-month post-partum period		
9	Lei et al. 2006 [93]	Implemented an intervention in CH	Assessed the effect of a millet drink, spontaneously fermented by lactic acid bacteria, as a therapeutic agent among Ghanaian children with diarrhoea	No effects of the intervention were found with respect to stool frequency, stool consistency and duration of diarrhea. But KSW was associated with greater reported well-being 14 days after the start of the intervention	A preventing effect of KSW on antibiotic-associated diarrhoea which could help reducing persistent diarrhoea.
PAPERS ON NEONATAL HEALTH					
1.	Chandramohan et al. 2005 [94]	Implemented an intervention in CH	The effects of intermittent preventive treatment for malaria in infants (IPTi) with sulfadoxine-pyrimethamine in an area of intense, seasonal transmission.	Intermittent preventive treatment for malaria with sulfadoxine-pyrimethamine proved effective in reducing malaria and anemia in infants.	There is concern about the possibility of a rebound in the incidence of malaria in the second year of life despite its effectiveness in the previous year.
2.	Edmond et al. 2008 [95]	Evaluated CH intervention which is already operational	Diagnostic accuracy of a verbal autopsy (VA) tool in ascertaining the causes of stillbirths and neonatal deaths	The VA performance for stillbirth diagnoses is poor. Accuracy was higher for intrapartum obstetric complications and antepartum maternal disease. For neonatal deaths, sensitivity was 60% for all major causes.	Further modifications are needed in the use of the World Health Organisation VA in routine child health programmes. There is also the need to access the diagnostic accuracy of the VA tool in other regions and in multicentre studies.

				Overall, VA diagnostic accuracy was higher than expected.	
4.	Bryce et al. 2010 [96]	Evaluated a CH intervention already operational	Analysed how the Lives Saved Tool (LiST) was used as part of an early assessment of the expected impact of MCH intervention plans.	Compared to 2006 levels, under-5 mortality could be reduced by at least 20% by 2011 by achieving national coverage targets for just four or five high-impact interventions.	The feasibility and usefulness of LiST as part of the program planning process at the community levels requires further experience.
5.	Oduro et al. 2012 [97]	Health & demographic surveillance system profile	The activities and potential of the NHDSS for collaborative research are described.	Using the NHDSS data, the attainment of the child survival MDGs has been rapid with huge decline in maternal mortality ratio and the impact of immunization on the relationship between poverty and child survival in the operational area.	NHDSS has been designed to provide an efficient platform for evaluating health and social interventions.
6.	Hulton et al. 2014 [98]	Use of evidence in MCH Policy.	Introduces the Evidence for Action (E4A) program, the rationale, and its effectiveness in initial findings across six E4A countries.	There were inadequacies in using data for decision-making and in political will for MNH for all E4A countries. Gaps in data access and information were key drawbacks to decision-making in all six countries.	Given that this approach is effective in dealing with the deficiencies responsible for poor quality of care, then others can build on this to make future investment in MNH more cost-effective.
7.	Hill et al. 2008 [99]	Use of knowledge in CH intervention.	Described how an integrated home visit intervention for newborns in Ghana was designed.	Identified community entry activities in mobilizing community support for the intervention, to encourage self-identification of pregnant and delivered women and to motivate the volunteer through community recognition.	Formative research is an important stage in helping to ensure the development of an effective, appropriate and sustainable intervention.

| 8. | Moyer et al. 2013 [100] | Analysed an MCH intervention already in practice. | Determined the types of access to care most strongly associated with facility-based delivery among women | Affordability was the strongest determinant linked to delivery location. Social access variables, including needing permission to seek healthcare and not being involved in decisions regarding healthcare contributed in reducing the possibility of facility-based delivery when examined individually. | Even among women with health insurance, affordability still remains an important determinant of facility delivery. However, social access factors had Affordability was an important determinant of facility delivery in Ghana—even among women with health insurance—but social access variables had a mediating role. |

Table 4: Profile and Characteristics of Policy Documents on Reproductive and Child Health in Ghana

S/No	Year of publication	Title of policy	Document source/publisher	Main focus of policy	Main research /evidence publication informing the policy cited in document	Process employed in the policy
1.	Ghana Health Service 2003. [101]	National Breastfeeding Policy	Ghana Health Service (GHS), Accra	Improve upon maternal and child health through the promotion, protection and support of optimal breastfeeding practices and appropriate complementary feeding practices	No scientific evidence was cited in the document, but other views of professionals were reflected	Developed through expert views
2.	Ministry of Health 2014. [102]	Ghana National Newborn Health Strategy and Action Plan 2014-2018	Ministry Of Health (MOH), Accra-Ghana	Provides a newborn scale-up strategy and action plan for addressing newborn mortality in Ghana	Employed a scientific-evidence based process for policy development	Adopted a detailed desk review of relevant policy on maternal and child health system performance in Ghana. Data on Household Survey (DHS, MICS) were reviewed. Field visit was adopted, Stakeholders discussions were initiated
3.	Ministry of Health 2007. [103]	Under 5 child Health Policy: 2007-2015	MOH, Ghana	Provides a framework for programme planning, implementation and evaluation geared towards improving child survival and wellbeing. Provides standards and guidelines to prevention and treatment of child illness	No academic publication was cited in the document	Developed through consultation of stakeholders views and a review of relevant policy document

4	Ghana Health Service 2015. [104]	Report on the Burden of Obstetric Fistula in Ghana	GHS, Ghana UNFPA	Report on the burden of obstetric fistula in Ghana. Examine that personnel capacity in managing the condition	Employed a scientific research evidence in the document write-up	Adopted a qualitative research approach with a survey in document preparation
5	Ministry of Health 2013. [105]	Postpartum Hemorrhage Prevention and Management Strategy For Ghana	MOH, Accra PATH	Provides a data on the incidence of postpartum hemorrhage in Ghana. Establish a framework and guideline for PPH prevention and management.	Cited some empirical –based research	Collection of expert views and stakeholder consultation as well as a review of some relevant institutional policy, reports and household survey.
6	Ministry of Health 2007. [106]	Anti-Malaria Drug policy for Ghana	MOH, Accra	Provides policy measures and guideline for the treatment of Malaria in Ghana	No publication is cited	Developed through stakeholder consultation and expert views
7	Ministry of Health (2015), [107]	National Condom and Lubricant Strategy (NCLS) 2016-2020	Ghana AIDS Commission, Accra USAID UNFPA GHS, Accra	Establishes a national strategic framework to promote quality sexual and reproductive health	No publication was cited in the document	Collection of information from national strategic and action plan for HIV/AIDS prevention, reproductive health etc. There was a consultation with other stakeholders

Table 5: Profile and Characteristics Protocols and Practice Guidelines on Reproductive and Child Health in Ghana

S/No	Year of publication	Title of policy	Document source/publisher	Main focus of policy	Main research /evidence publication informing the policy cited in document	Process employed in the policy
1	Ghana Health Service, 2000. [108]	National Family Planning Protocols	Ghana Health Service (GHS), Accra	Aims at providing a strategic guide to information on family planning methods in Ghana	No empirical evidence was cited in the document	Document was based on expert views and standards of operating procedure by professionals
2	Ghana Health Service, 2008. [109]	National Safe Motherhood Service Protocol	GHS, Accra MOH, Accra	Provides a guideline for treating and managing pregnancy-related compilation common to caregivers at all levels	No empirical evidence was cited in the document	Based on the views and standard operating procedure by experts in the field
3	Ghana Health Service, 2007 [110]	Adolescent Health Info Pack	GHS, Accra UNFPA UKaid	Focuses on the growing changes of adolescent (biological and social changes). Provides a guide on the risky sexual behaviours at the adolescent stage	No publication cited in the document	Developed from expert views and role play by adolescent to depict growing changes in the adolescent stage
4	Ministry of Health, 2011 [111]	What Every Pregnant Woman Should Know	MOH, Ghana	Provides information on the expectation of every pregnant woman based on the stages of pregnancy	No empirical evidence cited in the document	Based on the views and professional experiences of expert

5	UNFPA, 2014. [112]	Living with Fistula	UNFPA	Explore the views and lives of fistula survivors	No publication was cited in the document	Collection based on survivors' views, experiences and funding partners support to survivors
6	Ministry of Health, 2010. [113]	Concise Integrated Management of Neonatal and Childhood Illness	MOH, Accra	Provides a strategy for managing childhood diseases and a guide for preventing cause of death	No publication was cited in the document	Based on expert clinical opinion and expert survey in the field of Neonatal and Child health
7	Ghana Health Service, 2010 [114]	Maternal Health & Death Audit Guidelines	GHS, Accra	Aims at providing a framework for improving maternal health quality and a tool for monitoring maternal deaths in Ghana	No empirical evidence was cited. An institutional policy document was however cited	Employed a household survey method with expert views and a review of relevant policy documents
8	Ghana Statistical Service, 2007 [115]	Ghana Maternal Health Survey	GHS, GSS Inc. Macro	Provides empirical evidence on the incidence of maternal mortality. Establishes the prevalence of abortion in Ghana and provides guidelines on antenatal care attendance in Ghana	Empirical scientific evidence was cited in the document	Developed based on a household survey, review of relevant policy document and stakeholder involvement in the preparation of this document.

9	Ghana Health Service.	Ghana Health Service Newsletter For Adolescent and Young People	GHS, Accra.	Focuses on providing adolescent with information on adolescence- related challenges	No scientific evidence was established in the preparation of this document	Developed based on view of Adolescent and stakeholder's consultation
10	Ministry of Health, 2014 [116]	Guideline for Case Management of Malaria in Ghana	MOH, Accra	This policy is focused on providing guidelines for malaria case management in Ghana	No empirical evidence is cited in the document preparation	Produced through expert views and professional knowledge on the management of Malaria in Ghana
11	Ministry of Health, 2015 [117]	National Policy and Guidelines for Infection Prevention and Control in Health Care Settings	MOH, Ghana	Lays down policies and broad guidelines required for the practice of a nationally acceptable standard of IPC in health care settings	Document cites several scientific research papers and laws of Ghana as well as reports from key international organisations	Through a consultative approach, including several government and non-governmental organisations and individuals

12	Ghana Health Service, 2014 [118]	National Reproductive Health Service Policy and Standards, 3rd Edition	GHS, Accra	Provides explicit directions and focus for streamlining the training and service provision of reproductive health in addition to programmes that make RH accessible and affordable	No scientific research paper was cited. However, relevant laws in Ghana related to abortion and crime were also cited.	A consultative approach including government agencies, regulatory bodies, development partners, NGO's and other champions working in the area of reproductive health
13	Ghana Health Service, 2012 [119]	Prevention and Management of Unsafe Abortion: Comprehensive Abortion Care and Services Standards & Protocols	GHS, Accra	Provision of critical guide for the prevention and management of unsafe abortion	Document cite several scientific research papers as well as documents from other key research organisations	Prepared jointly, and in different stages, by the GHS/MOH and several institutions, individuals and communities
14	World Health Organisation, 2010 [120]	Adolescent Job Aid: A Handy Desk Reference Tool for Primary Level Health Workers	World Health Organization (WHO)	It contains guidance on commonly occurring adolescent-specific or non-adolescent-specific problems or concerns that have not been addressed in existing WHO guidelines, conditions in Adolescents.	No scientific research evidence was cited in the document	Evidence-based approach together with extensive consultation and country level testing for further evidence was used in developing the document
15	Ministry of Health, 2010. [121]	Malaria in Pregnancy. Training for Providers	Ministry of Health (MOH), Accra USAID, WHO, GLOBALFUND	Provides strategic guide to health providers for malaria treatment in Ghana	No publication was cited	Prepared through role play, case studies and expert views

Table 6: Profile and Characteristics of Papers on Scaling Up of RCH Interventions on Ghana

S/No	Author/year of publication/ reference	Category of intervention	Health issue of intervention	Evidence-generated	Policy relevant conclusion
1.	Kapungu et al 2013 [122]	Evaluation of phase 1 of an MCH intervention already operational	Operations research study, designed to reduce postpartum hemorrhage (PPH)-related morbidity and mortality.	Overall, 96% of deliveries resulted in healthy outcomes for the mother; with only 4.0% of births having complications.	The initial work carried out in Phase 1 of the study is vital in guiding misoprostol distribution in Phase 2 although challenges exist.
2.	Witter et al. 2009 [70]	Evaluates MHC intervention already operational	National delivery exemption policy for free maternal health care	Delivery exemptions can be effective and cost-effective, and despite being universal in application, it can benefit the poor. However there is the need for adequate funding, and strong institutional ownership.	Appropriate and effective implementation of the free maternal health care policy is key if it is expected to result in reduced mortality for mothers and babies.
3.	Twum-Danso et al 2014. [84]	Evaluated MHC intervention already in operational	Test the feasibility and effectiveness of the new early post-natal care (PNC) policy and its subsequent scale-up throughout northern Ghana.	There is a slower increase in skilled delivery over a longer period of time. The early PNC policy was scaled up over the subsequent 2 years to 576 health facilities in all 38 districts of northern Ghana.	The study provides a model for improving the implementation of other national health policies to accelerate the achievement of the Millennium Development Goals in Ghana and other resource-poor countries.
4.	Singh et al. 2013 [91]	Impact evaluation of MCH intervention already in operational	Evaluate the influence of the early phase of Project Fives Alive! a national child survival improvement project, on key maternal and child health outcomes.	There was an association between the early pregnancy identification change categories with increased skilled delivery. Also a greater number of change categories tested was associated with increased skilled delivery.	The QI approach of testing and implementing simple and low cost locally inspired changes has the potential to lead to improved health outcomes at scale both in Ghana and other low- and middle-income countries.

5	de Savigny et al. 2012 [123]	Adoption of innovation in health system.	Evaluated the Introduction of vouchers for malaria prevention in Ghana and Tanzania	Investment in long-term, managed stakeholder engagement throughout the design and implementation stages of new complex health interventions appears to be critical for ownership and sustained integration of the intervention in the system.	Contextual requirements for the success of an intervention should be considered before an intervention is picked from one context and piloted in another.
6.	Philips et al., 2007 [124]	Evaluation of a scaled-up intervention	Used research to guide the development and scaling up community-based health and family planning programmes	The process concluded with research-guided programme expansion, with each stage associated with shifts in generations of questions, mechanisms and outcomes as the process unfolded	Large-scale health systems development was achieved
7.	Awoonor-Williams et al. 2004 [125]	Evidence-based Innovation and Health-sector Reform gap.	Bridging the gap between evidence-based innovation and national health-sector reform.	The favourable effect of the community-based health planning and services intervention on family planning and safe-motherhood indicators is suggestive that innovations such as the Navrongo experiment is transferable to impoverished rural settings elsewhere.	The results confirm the need for strategies to bridge the gap between Navrongo evidence-based innovation and national health-sector reform.
8.	Awoonor-Williams et al. 2013. [126]	Evaluated the impact of a MCH intervention.	Described the Ghana Essential Health Intervention Project (GEHIP), a plausibility trial of strategies for strengthening CHPS, especially in the areas of maternal and newborn health.	GEHIP improves the CHPS model in various ways.	GEHIP is expected to contribute to national health policy, planning, and resource allocation that will be needed to accelerate progress with the MDGs.
9.	Hill et al. 2010 [127]	Evaluated CH intervention	Collected data on thermal care practices in	Respondents knew that keeping the baby warm was essential for health but 71%	Thermal care is a key component of community newborn interventions, the

			rural Ghana to inform the design of a community newborn intervention.	of babies born at home had delayed drying, 79% delayed wrapping, 93% early bathing and 10% were placed skin-to-skin.	design of which should be based on an understanding of current behaviours and beliefs
10.	Awoonor-Williams et al. 2013 [128]	Lessons learnt from a scaled up intervention	Strengthening of health systems related to maternal health	That community-based care could reduce childhood mortality by half in only 3 years.	Key scaling-up lessons: (1) place nurses in home districts but not home villages, (2) adapt uniquely to each district, (3) mobilize local resources, (4) develop a shared project vision, and (5) conduct ''exchanges'' so that staff who are initiating operations can observe the model working in another setting, pilot the approach locally, and expand based on lessons learned.

APPENDIX 1: ANALYSIS OF QUESTIONAIR ADMINISTERED DURING THE ACCRA STAKEHOLDER MEETING

1. Biodata

i) Gender

Gender	Freq	Percent	Cum.
Female	5	35.71	35.71
Male	9	64.29	100.00
Total	14	100.00	

ii) Age

age	Freq.	Percent	Cum.
25-34 years	3	18.75	18.75
35-44 years	4	25.00	43.75
>=45 years	9	56.25	100.00
Total	16	100.00	

2. Official designation attributes

(iii) Years on the job

Years	Freq.	Percent	Cum.
1	5	31.25	31.25
2	2	12.50	43.75
3	4	25.00	68.75
5	1	6.25	75.00
6	1	6.25	81.25
8	2	12.50	93.75
12	1	6.25	100.00
Total	16	100.00	

3. Policy Influence

i) Level of Work

(LOW)	Freq.	Percent	Cum.
Primary	4	33.33	33.33
Secondary	2	16.67	50.00
Tertiary	6	50.00	100.00
Total	12	100.00	

4. Knowledge & application of ICT

i) Computer Literacy

(CL)	Freq.	Percent	Cum.
Yes	16	100.00	100.00
Total	16	100.00	

ii) Level of computer literacy

(LCL)	Freq.	Percent	Cum.
Appreciation	2	15.38	15.38
Application	11	84.62	100.00
Total	13	100.00	

i) Office computer

(PI)		Freq.	Percent	Cum.
Indirect		7	50.00	50.00
Direct		7	50.00	100.00
Total		14	100.00	

ii) Access to Personal computer

(PCU)	Percent	Freq.	Cum
No	2	12.50	12.50
Yes	14	87.50	100.00
Total	16	100.00	

iii) Usage of computer operations

(UCO)	Freq.	Percent	Cum.
High usage	15	100.00	100.00
Total	15	100.00	

iv) Internet Use

(IU)	Freq.	Percent	Cum.
Yes	16	100.00	100.00
Total	16	100.00	

v) Frequency of computer use

(FIU)	Freq.	Percent	Cum.
Very Frequently	13	81.25	81.25
Frequently	2	12.50	93.75
Occasionally	1	6.25	100.00
Total	16	100.00	

vi) Functional E-mail Address

(E-mail)	Freq.	Percent	Cum.
Yes	16	100.00	100.00
Total	16	100.00	

vii) Knowledge of electronic databases

(KEDB)	Freq.	Percent	Cum.
Inadequate	2	12.50	12.50
Fairly adequate	4	25.00	37.50
Adequate	8	50.00	87.50
Very adequate	2	12.50	100.00
Total	16	100.00	

viii) Capacity to obtain research evidence from electronic databases

(CORE)	Freq.	Percent	Cum.
Inadequate	1	6.67	6.67
Fairly adequate	4	26.67	33.33
Adequate	8	53.33	86.67
Very adequate	2	13.33	100.00
Total	15	100.00	

5. Individual Knowledge of the policy-making process.

i) Involvement in policy making process

(IPP)	Freq.	Percent	Cum.
Less frequent	2	16.67	16.67
Fairly frequent	4	33.33	50.00
Frequently	5	41.67	91.67
Very frequently	1	8.33	100.00
Total	12	100.00	

ii) Knowledge of the meaning of policy

(KP)	Freq.	Percent	Cum.
Fairly adequate	1	6.67	6.67
Adequate	14	93.33	100.00
Total	15	100.00	

iii) Understanding of policy context

(UPC)	Freq.	Percent	Cum.
Fairly adequate	3	20.00	20.00
Adequate	12	80.00	100.00
Total	15	100.00	

iv) Knowledge of stakeholder's involvement in policy-making

(KSHIP) Freq.	Percent	Cum.	
Inadequate	1	6.67	6.67
Fairly adequate	2	13.33	20.00
Adequate	12	80.00	100.00
Total	15	100.00	

V) Understanding of policy-making process

(UPP)	Freq.	Percent	Cum.
Inadequate	2	13.33	13.33
Fairly adequate	4	26.67	40.00
Adequate	9	60.00	100.00
Total	15	100.00	

vi) Understanding of the meaning of priority setting in policy making.

(UPPS)	Freq.	Percent	Cum.
Inadequate	2	13.33	13.33
Fairly adequate	4	26.67	40.00
Adequate	8	53.33	93.33
Very adequate	1	6.67	100.00
Total	15	100.00	

vii) Understanding the meaning of policy brief

(UPB)	Freq	Percent	Cum
Inadequate	2	13.33	13.33
Fairly Adequate	4	26.67	40.00
Adequate	9	60.00	100.00
Total	15	100.00	

viii) Understanding what policy dialogue is?

(UPD)	Freq.	Percent	Cum.
Inadequate	5	35.71	35.71
Fairly adequate	2	14.29	50.00
Adequate	7	50.00	100.00
Total	14	100.00	

ix) Knowledge on role of researchers in policy making.

(KRRP)	Freq.	Percent	Cum.
Inadequate	1	6.67	6.67
Fairly adequate	1	6.67	13.33
Adequate	11	73.33	86.67
Very adequate	2	13.33	100.00
Total	15	100.00	

6. Individual capacity for use of evidence

i) Understanding on what evidence is in policy making context

(UEP)	Freq	Percent.	Cum.
Inadequate	1	6.67	6.67
Fairly adequate	1	6.67	13.33
Adequate	11	73.33	86.67
Very adequate	2	13.33	100.00
Total	15	100.00	

ii) Knowledge on types of evidence that can be used for policy making

(KTEP)	Freq.	Percent	Cum.
Fairly adequate	8	53.33	53.33
Adequate	7	46.67	100.00
Total	15	100.00	

iii) Knowledge on sources of evidence used for policy making

(KSEPP)	Freq.	Percent	Cum.
Fairly adequate	7	46.67	46.67
Adequate	8	53.33	100.00
Total	15	100.00	

iv) Capacity to select relevant evidence for policymaking

(CIREP)	Freq.	Percent	Cum.
Inadequate	1	6.67	6.67
Fairly adequate	5	33.33	40.00
Adequate	9	60.00	100.00
Total	15	100.00	

v)   Ability to adapt evidence used for policy making

(AEP)	Freq.	Percent	Cum.
Inadequate	1	6.67	6.67
Fairly adequate	8	53.33	60.00
Adequate	6	40.00	100.00
Total	15	100.00	

vi)   Ability to transform evidence into policy useable form

(ATEPU)	Freq.	Percent	Cum.
Inadequate	2	13.33	13.33
Fairly adequate	10	66.67	80.00
Adequate	3	20.00	100.00
Total	15	100.00	

7. Organizational geographical focus and profile.

i)   Organization's geographical coverage

(OGC)	Freq.	Percent	Cum.
LGA	2	14.29	14.29
State	7	50.00	64.29
Federal	3	21.43	85.71
International	2	14.29	100.00
Total	14	100.00	

ii)   Organisational capacity to cover geographical area of operation

a)   Manpower

(OC-Man)	Freq.	Percent	Cum.
Grossly inadequate	2	13.33	13.33
Inadequate	3	20.00	33.33
Fairly adequate	3	20.00	53.33
Adequate	6	40.00	93.33
Very adequate	1	6.67	100.00
Total	15	100.00	

b)   Logistics

(OC-Log)	Freq.	Percent	Cum.
Grossly inadequate	2	13.33	13.33
Inadequate	7	46.67	60.00
Fairly adequate	5	33.33	93.33
Very adequate	1	6.67	100.00
Total	15	100.00	

c)   Funding

(OC-Fund)	Freq.	Percent	Cum.
Grossly inadequate	4	26.67	26.67
Inadequate	8	53.33	80.00
Fairly adequate	2	13.33	93.33
Very adequate	1	6.67	100.00
Total	15	100.00	

d)   Facilities

(OC-Fac)	Freq.	Percent	Cum.
Grossly inadequate	1	6.67	6.67
Inadequate	7	46.67	53.33
Fairly adequate	6	40.00	93.33
Very adequate	1	6.67	100.00
Total	15	100.00	

e)   External support

(OC-Ext)	Freq.	Percent	Cum.
Grossly inadequate	2	13.33	13.33
Inadequate	9	60.00	73.33
Fairly adequate	2	13.33	86.67
Adequate	1	6.67	93.33
Very adequate	1	6.67	100.00
Total	15	100.00	

iii)   Patronage of services provided by organization within the geographical area of operation

(PSv)	Freq.	Percent	Cum.
Grossly inadequate	1	7.14	7.14
Inadequate	2	14.29	21.43
Fairly adequate	6	42.86	64.29
Adequate	3	21.43	85.71
Very adequate	2	14.29	100.00
Total	14	100.00	

iv)   Availability of ethical unit

(AEU)	Freq.	Percent	Cum.
No	4	28.57	28.57
Yes	10	71.43	100.00
Total	14	100	

v)   Availability of document on health research ethics in organization of work.

(ADRE)	Freq.	Percent	Cum.
No	5	38.46	38.46
Yes	8	61.54	100.00
Total	13	100.00	

vi)   Availability of document on best practice in organization

(ADBP)	Freq.	Percent	Cum.
No	7	58.33	58.33
Yes	5	41.67	100.00
Total	12	100.00	

vii)   Degree of adherence to guidelines on ethics.

(DAG)	Freq.	Percent	Cum.
Grossly inadequate	1	8.33	8.33
Inadequate	3	25.00	33.33
Fairly adequate	5	41.67	75.00
Adequate	3	25.00	100.00
Total	12	100.00	

8. **Policy & policymaking process related to maternal, newborn & child health**

i)   Existence of a policy on health research

(EP-MCNH)	Freq.	Percent	Cum.
No	6	42.86	42.86
Yes	8	57.14	100.00
Total	14	100.00	

ii)   Defined stakeholder's views and integration with a policy on health research

(SHV-MCNH)	Freq.	Percent	Cum.
No	2	16.67	16.67
Yes	10	83.33	100.00
Total	12	100.00	

iii)   Existence of a forum or process to coordinate the setting of health research priorities.

rpmcnh_n	Freq.	Percent	Cum.
No	4	28.57	28.57
Yes	10	71.43	100.00
Total	14	100.00	

iv)   Extent of usage of research done by others

(OUR-MCNH)	Freq.	Percent	Cum.
Inadequate	5	35.71	35.71
Fairly adequate	2	14.29	50.00
Adequate	7	50.00	100.00
Total	14	100.00	

v)   Extent of usage of research done by own organization

(URO-MCNH)	Freq.	Percent	Cum.
Inadequate	5	33.33	33.33
Fairly adequate	7	46.67	80.00
Adequate	3	20.00	100.00
Total	15	100.00	

vi)   Extent of Usage of data collected

(UD-MCNH)	Freq.	Percent	Cum.
Inadequate	4	28.57	28.57
Fairly adequate	5	35.71	64.29
Adequate	4	28.57	92.86
Very adequate	1	7.14	100.00
Total	14	100.00	

vii) Relevance of evidence provided by organization for policy making

(RE-MCNH)	Freq.	Percent	Cum.
Fairly relevant	5	35.71	35.71
Relevant	5	35.71	71.43
Very relevant	4	28.57	100.00
Total	14	100.00	

viii) Number of policy documents policy makers in the organization for the past 5 years.

(NPD-MCNH)	Freq.	Percent	Cum.
1-3 policy documents	5	83.33	83.33
4-6 policy documents	1	16.67	100.00
Total	6	100.00	

ix)   Number of policy documents updated by organization in the past 5 years.

(NPDUp-MCNH)	Freq.	Percent	Cum.
1-3 policy documents	5	100.00	100.00
Total	5	100.00	

9. **Acquisition of research evidence relevant to maternal, newborn & child health**

   a) **Individual research skill**

i) Adequacy in present knowledge about conducting research in general and specifically MNCH.

(AKIR)	Freq.	Percent	Cum.
Grossly inadequate	1	6.67	6.67
Fairly adequate	7	46.67	53.33
Adequate	7	46.67	100.00
Total	15	100.00	

ii)   Ability to access and use existing research evidence

(AUER)	Freq.	Percent	Cum.
Fairly adequate	4	26.67	26.67
Adequate	11	73.33	100.00
Total	15	100.00	

b) Institutional / organizational incentive for research

i) Organizational capacity to initiate research

(COIR)	Freq.	Percent	Cum.
Grossly inadequate	1	6.67	6.67
Inadequate	1	6.67	13.33
Fairly adequate	3	20.00	33.33
Adequate	7	46.67	80.00
Very adequate	3	20.00	100.00
Total	15	100.00	

ii) Organizational capacity to source for research evidence

(COSRE)	Freq.	Percent	Cum.
Inadequate	1	6.67	6.67
Fairly adequate	2	13.33	20.00
Adequate	8	53.33	73.33
Very adequate	4	26.67	100.00
Total	15	100.00	

iii) Level of research incentives available in organization.

(LRI)	Freq.	Percent	Cum.
Grossly inadequate	4	26.67	26.67
Inadequate	5	33.33	60.00
Fairly adequate	4	26.67	86.67
Adequate	2	13.33	100.00
Total	15	100.00	

10. **Assessing the validity, quality & applicability of research evidence relevant to maternal, newborn & child health**

   a) Individual research skill

   i) Skill to evaluate & appreciate the quality of research methodology.

(SEQRM)	Freq.	Percent	Cum.
Inadequate	2	13.33	13.33
Fairly adequate	8	53.33	66.67
Adequate	5	33.33	100.00
Total	15	100.00	

   ii) Skill to evaluate the reliability of specific research evidence and to compare research methods and results

(SERECRM)	Freq.	Percent	Cum.
Inadequate	1	7.14	7.14
Fairly adequate	9	64.29	71.43
Adequate	4	28.57	100.00
Total	14	100.00	

ii)
   1. Skill to identify relevant similarities and differences between research evidence

(RSD-RE)	Freq.	Percent	Cum.
Inadequate	1	6.67	6.67
Fairly adequate	8	53.33	60.00
Adequate	6	40.00	100.00
Total	15	100.00	

   2. Skill to evaluate the differences in the research evidences in context of your organization.

(DRE) Freq.	Freq.	Percent	Cum.
Inadequate	1	6.67	6.67
Fairly adequate	8	53.33	60.00
Adequate	6	40.00	100.00
Total	15	100.00	

b) Institutional / organizational incentive for research

   i) Incentive for assessment of validity, quality and applicability of research evidence.

(OIA-RE)	Freq.	Percent	Cum.
Grossly inadequate	3	20.00	20.00
Inadequate	5	33.33	53.33
Fairly adequate	3	20.00	73.33
Adequate	4	26.67	100.00
Total	15	100.0	

ii) Availability of research evidence implementation committee.

(IERE)	Freq.	Percent	Cum.
Grossly inadequate	3	20.00	20.00
Inadequate	7	46.67	66.67
Fairly adequate	3	20.00	86.67
Adequate	1	6.67	93.33
Very adequate	1	6.67	100.00
Total	15	100.00	

10) **Adapting the format of the research results to provide information useful to decision makers relevant to maternal, newborn & child health**
a) Individual research skill

i) Ability to present results in concisely in accessible language.

(ASRR-AL)	Freq.	Percent	Cum.
Fairly adequate	6	40.00	40.00
Adequate	8	53.33	93.33
Very adequate	1	6.67	100.00
Total	15	100.00	

ii) Ability to synthesize in one document relevant research and analysis from other sources

(ASRR-IAS)	Freq.	Percent	Cum.
Inadequate	2	13.33	13.33
Fairly adequate	6	40.00	53.33
Adequate	6	40.00	93.33
Very adequate	1	6.67	100.00
Total	15	100.00	

iii) Ability to link research results to key issues and provide recommendations.

(ASRR-LKI)	Freq.	Percent	Cum.
Fairly adequate	5	33.33	33.33
Adequate	8	53.33	86.67
Very adequate	2	13.33	100.00
Total	15	100.00	

ii) Ability to use chats, tables, graphs, pictogram, bullet/power point presentation.

(APRDMA)	Freq.	Percent	Cum.
Fairly adequate	4	26.67	26.67
Adequate	7	46.67	73.33
Very adequate	4	26.67	100.00
Total	15	100.00	

b) Institutional /organizational incentive for research
i) Incentives to encourage the provision of research evidence to decision makers

(IEREDM)	Freq.	Percent	Cum.
Grossly inadequate	2	13.33	13.33
Inadequate	4	26.67	40.00
Fairly adequate	5	33.33	73.33
Adequate	2	13.33	86.67
Very adequate	2	13.33	100.00
Total	15	100.00	

11.Application of evidence in decision making relevant to maternal, newborn & child health

a) **Institutional / organizational incentive for research**

i) Level of human resource

(HUMANRES)	Freq.	Percent	Cum.
Grossly inadequate	1	6.67	6.67
Inadequate	8	53.33	60.00
Fairly adequate	4	26.67	86.67
Adequate	2	13.33	100.00
Total	15	100.00	

ii) The organisation's job descriptions and performance incentives include enough focus on activities which encourage using research

(JDER)	Freq.	Percent	Cum.
Grossly inadequate	2	13.33	13.33
Inadequate	5	33.33	46.67
Fairly adequate	6	40.00	86.67
Adequate	2	13.33	100.00
Total	15	100.00	

iii) Management participate in frequent forum and discuss research evidence related to organizational goals

(MFS)	Freq.	Percent	Cum.
Grossly inadequate	3	20.00	20.00
Inadequate	6	40.00	60.00
Fairly adequate	5	33.33	93.33
Adequate	1	6.67	100.00
Total	15	100.00	

iv) Communication of corporate strategy and priority areas for improvement by management

(SPA)	Freq.	Percent	Cum.
Grossly inadequate	2	13.33	13.33
Inadequate	5	33.33	46.67
Fairly adequate	4	26.67	73.33
Adequate	4	26.67	100.00
Total	15	100.00	

v) Organisation has effective communication channels

(ECC)	Freq.	Percent	Cum.
Grossly inadequate	2	13.33	13.33
Inadequate	4	26.67	40.00
Fairly adequate	6	40.00	80.00
Adequate	3	20.00	100.00
Total	15	100.00	

vi) Our corporate culture is to value and reward flexibility, change, and continuous quality

improvement, and we provide adequate resources at all levels to support change.

(OCC) Freq.	Freq.	Percent	Cum.
Grossly inadequate	1	6.67	6.67
Inadequate	8	53.33	60.00
Fairly adequate	3	20.00	80.00
Adequate	2	13.33	93.33
Very adequate		6.67	100.00
Total	15	100.00	

vii) When we make major decisions, we usually allow enough time to identify researchable questions and create/ obtain, analyze and consider research results and other evidence.

(TER)	Freq.	Percent	Cum.
Grossly inadequate	1	6.67	6.67
Inadequate	6	40.00	46.67
Fairly adequate	3	20.00	66.67
Adequate	5	33.33	100.00
Total	15	100.00	

viii) Management team has enough expertise to evaluate the feasibility of each option, including potential impact across the organization as well as on its clients, partners and other stakeholders

(EXPERTS)	Freq.	Percent	Cum.
Grossly inadequate	1	6.67	6.67
Inadequate	2	13.33	20.00
Fairly adequate	3	20.00	40.00
Adequate	8	53.33	93.33
Very adequate	1	6.67	100.00
Total	15	100.00	

ix) When staff develop or identify high quality and relevant research, decision makers will usually give formal consideration to any resulting recommendations.

(FCRR)	Freq.	Percent	Cum.
Grossly inadequate	1	6.67	6.67
Inadequate	4	26.67	33.33
Fairly adequate	5	33.33	66.67
Adequate	5	33.33	100.00
Total	15	100.00	

x) Staff and stakeholders know when and how major decisions will be made

(SKD) Freq.	Freq.	Percent	Cum.
Grossly inadequate	1	6.67	6.67
Inadequate	4	26.67	33.33
Fairly adequate	5	33.33	66.67
Adequate	5	33.33	100.00
Total	15	100.00	

xi) The staff who have provided evidence and analysis usually participate in the discussion before a decision is made and, when possible, so do non-staff researchers

Staff evidence	Freq.	Percent	Cum.
Inadequate	3	21.43	21.43
Fairly adequate	6	42.86	64.29
Adequate	4	28.57	92.86
Very adequate	1	7.14	100.00
Total	14	100.00	

xii) When a decision is made, feedback to staff and appropriate stakeholders includes a rational for the decision, and review of how the available evidence influenced the choices made.

(FbD)	Freq.	Percent	Cum.
Inadequate	4	28.57	28.57
Fairly adequate	5	35.71	64.29
Adequate	4	28.57	92.86
Very adequate	1	7.14	100.00
Total 14	14	100.00	