Mapping of health research institutions in Ghana: Landscaping and comparative analysis

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Abbreviations

BMCs…………………………Budget Management Centers
COHRED……………………Conference on Health Research for Development
CPR…………………………..Contraceptive Prevalence Rate
CHPS…………………………Community Health Planning Services
DFID………………………….Department for International Development
GDP…………………………..Gross Domestic Product
GDN…………………………..Global Development Network
GOG…………………………..Government of Ghana
ECOWAS……………………..Economic Community of West African States
ENHR…………………………Essential National Health Research
ERB…………………………...Ethical Review Board
FDA………………………… Food and Drugs Authority
GDN………………………….Global Development Network
GSS………………………… Ghana Statistical Service
HIV/AIDS……………………..Human Immune Virus/Acquired Immunity Deficiency Syndrome
HRP…………………………..Health Research Project
HRU…………………………..Health Research Unit
HTAs ………………………….Health Technology Assessment
IMR………………………….. Infant Mortality Rate
ITN……………………………Insecticide Treated Nets
JPC……………………………Joint Ghanaian-Dutch Program Committee
LIO……………………………Letters of Intent
LIMIC………………………… Lower Middle Income Country
Mohr………………………….Ministry of Health
MR………………………….. Mortality Rate
NMIMR……………………….Noguchi Memorial Institution for Medical Research
NHIF…………………………. National Health Insurance Fund
NHIS…………………………..National Health Insurance Scheme
NCDS…………………………Non-Communicable Diseases
NGOs………………………….Non-Governmental Organization
NHRC…………………………Navrongo Health Research Centre
OECD…………………………Organization for Economic Cooperation and Development
RAWOO……………………. The Netherlands Development Assistant Research Council
RCT………………………….. Randomized Controlled Trials
SBS……………………………Sector Budget Support
STC…………………………...Scientific and Technical Committee
Swap ………………………… Sector –Wide Approach
TDC…………………………. Tropical Disease Research
TB……………………………Tuberculosis
VAST……………………….. Vitamin A Supplementation Trials
WHO………………………….World Health Organization

Executive Summary

The Department for International Development (DFID) commissioned a landscape mapping exercise of health research in Ghana as part of its framework for transitioning its international aid in Ghana. DFID considered that health research and its use in policy development need to be strengthened and sustained over the transition period. The study conducted by the Centre for Health and Social Services focused on a broad understanding of the types or forms of research are being done in Ghana.

The study drew on early definitions of health research as a structured field with conceptual underpinnings. It articulated health research as an "inquiry to produce knowledge about the structure, processes, or effects of personal health services" (Institute of Medicine 1979, p14) and; as "…a field of inquiry that examines the roles of organization, finance, manpower, technology, and prevention in the provision of health care services, and their impact on utilization, cost, and quality of care" (Steinwachs1991, p. 10). For those involved in health systems research this might involve testing new drugs, vaccines, surgical procedures, or medical devices in clinical trials or understanding how health systems and policy impact on health service outcomes (Sheikh et al., 2011).

Eleven main questions were presented in the terms of reference. These may be aggregated into five broad objectives as follows:

- Identify any major enablers and barriers to doing health research in Ghana including why and how research is carried out?
- Identify how research questions are identified and by whom?
- Identify the individual sectors within health that research is being conducted in such as malaria, health systems, maternal health etc.
- Identify the different types of research being produced – such as clinical trials, secondary data analysis, operational research etc.
- Provide a comparison of the Ghana health research sector with similar Middle Income Countries' health research sectors

The study method was exploratory using desk review, on-line survey and in-depth interviews to collect data. The data was analysed both qualitatively and quantitatively with findings presented using graphics and narratives to bring out commentaries and vignettes captured during the exercise.

Summary of findings

Evidence from literature suggests an increasing recognition of the value of research for health (WHO, 2013). There is a general increase in the amount of research being undertaken but these

increases were mainly observed in developed countries with only marginal growth observed in middle income and developing countries. While health research policy has become widely available in the Africa Region (Sombre et al 2013) health policy priority setting remains uncoordinated and generally driven by donor funding. Domestic funding is low. The 58th World Health Assembly in 2005, resolution WHA 58.34 that urged Member States to 'invest at least 2% of national expenditures in research and research capacity strengthening, and at least 5% of project and program aid for the health sector from development aid agencies should be earmarked for research and research capacity strengthening' (WHO 2005). No African country including Ghana had achieved this target has not been achieved.

In Ghana, a strong positive in the health research environment is the historical development of systems which was the result of the Five year Policy Frame work on Research for Development produced in 1992 (MoH, 1992). The document set out the mechanism for establishing a research agenda for the health sector, the mechanism for capacity development and for coordination of research. As part of the implementation structures the national Health Research Unit (HRU) was established. In addition three field research centres in Navrongo, Dodowa and Kintampo were planned and developed as agencies of the Ministry of Health to support research activities. Funding was provided by the Government of Ghana and the then British Overseas Development Agency, the WHO Health Systems Research Division and the Council for Health Research and Development (COHRED). These institutions have continued to flourish while research teams set up in all ten regions to respond to need for information (Adjei and Gyapong, 2001) have since died out.

Public sector universities and their research agencies also emerged as strong research institutions. Notable among these is the University of Ghana with various departments undertaking research. Noguchi Memorial Institute for Medical Research stands out as the leading national clinical health research institute. The Kumasi Centre for Collaborative Research of the Kwame Nkrumah University of Science and Technology also has a strong clinical research agenda. There was no outstanding private sector university or college in research. A few individual private research centres are doing some quality research work.

There is no national health research ethics committee in Ghana though several institutions may have their own process of ethical clearance. The Ghana Health Service is as an example has an Ethics Review Committee that serves its internal purpose but has been drawn upon by other institutions to support their ethical clearance requirements for external funding or research in Ghana. The Council for Industrial and Scientific Research also has an in-house ethics committee that support institutions requiring their review and ethical comment in support of grant applications. Respondents however suggest that a multi-stakeholder national Committee with a permanent secretariat needs to be established. Such a body exists in South Africa and oversees health research and is seen as very useful (COHRED, 2000). Partnerships were considered an

important ingredient in effective health research development. The Ghana-Dutch Collaboration was mentioned severally as providing a good example of such partnerships though some areas of implementation required significant improvement.

Average success in proposals that led to a successful grant over the last three years is low. About 38% of institutions average less than one successful grant per annum while 16% were unsuccessful over a three year period in mobilising any new research funding. Most research fell in the fundamental research and applied research of Stokes (1997) quadrant of research types. These focused on the epidemiology, coverage, intervention and cost effectiveness and impact of health technology. Only two were clinical trials including drugs. The various research topics closely mirror the key performance indicators tracked by the health sector. There however was by accident rather than a deliberate or systematic link between the indicators and researcher choice.

Generally most research organisations in Ghana had a fair level of human resource mix. Over 48% have more than 15 people on their staff nominal roll. These were mainly in the public sector. All the research institutions who responded to the survey had at least one PhD qualified staff member.

The most common method of recruitment is head hunting. Respondents were however concerned that poaching from other organisations was common because "best skills are hard to find". Most individual (86%) interviewed complained about poaching of their qualified staff. Many raised concerns about difficulty in retaining newly trained staff using institutional resources due to the high variability in project-based remuneration.

Aside of salaries to public sector research and academic institutions government provided no avenues for access to research funds. This probably is however a region-wide challenge (Mirzoev et al.'s 2013). Given the limited opportunities from government, some respondents in this study suggested that international funding will have to continue for a long time to come.

North-south collaborations were considered beneficial though respondents will prefer equal partnership and recognition. The main concern was variation in remuneration and cost sharing between northern and southern partner. On South-South collaboration, was considered "tricky". The challenge is resource constraint that leads to uncertainty in the collaboration running its full course. Experience as recounted by respondents suggests that successful south-south collaboration always had a northern partner component. Private sector respondents were concerned that collaboration opportunity by development partners was biased and benefitted only the public sector.

In Ghana, different media was used for disseminating health research findings. Use of workshops and seminars was common while broadsheet newspapers found appeal among researchers. Publications in peer review journals were few through all the researchers interviewed indicated at least one publication in a peer reviewed journal. Nevertheless most researchers (87%) preferred to publish in northern or east and South African journals. The Ghana Medical Journal was considered less credible. Generally Ghanaian researchers appeared as contributors with five or more contributors in published articles. The lead authors (74%) were northern research collaborators. Very few Ghanaian authors (6%) appeared as end name authors which usually suggest a senior researcher and publication supervisor.

Recommendations

Given the various findings and analysis made the following is recommended to improve the Ghana health research landscape

Recommendation 1: A national health research priorities and strategic plan should be developed using a multi-stakeholder consultative approach under the auspices of the Ministry of Health.
Recommendation 2: There is a general capacity issue identified for writing of successful research proposals. This needs to be addressed at a fundamental level through workshop type programmes nationally and internationally. The type of training should fit the Stokers (1997) model quadrant for research so a balanced portfolio is developed nationally and based on national research priority areas
Recommendation 3: The Ghana-Dutch Research Collaboration has shown that a centrally created health research fund holds great potential to be tailored towards funding national priorities. This option should be explored to develop north-south pooled funding for research. The fund governance systems should be structured to address the weaknesses that existed under the HPR. Government should be encouraged to contribute to the fund (target 2% Health Expenditure as required by WHO) and access fairly opened with possible quota system for the public and non-government sector.
Recommendation 4: The Ministry of Health should appoint an experienced health research professional to head the Research Division and assign it with a health policy and liaison function. A Common Management Arrangement for Health Research may be developed to provide the framework for the health policy and liaison function.
Recommendation 5: An independent National Health Research and Ethics Council backed by legislature needs to be constituted with a full time Secretariat; with clear and transparent criteria for electing its membership. Its mandate should include standards settings, review and approval of research proposals, management of the research fund, health research repository, publishing a national registry of credible research institutions and organisations doing research. The membership may include representatives of the various research groups with emphasis on adequate non-government and private sector representation.

Recommendation 6: A Society for Health Research Professionals in Ghana (SHREP-G) should be facilitated and formed to serve as a coordinating body of professionals and platform for dialogue among professionals. It will also serve to provide coordinated input into governance, policy and legislative issues from the perspective of the practitioner

Recommendation 7: To improve diversity a conscious effort should be made to identify health specialised universities and build their laboratory capacities to engage in health research. An appropriate framework should be developed to support private-public-partnerships in research infrastructure sharing with appropriate incentives by the National Health Research and Ethics Council.

Recommendation 8: Continued capacity building for research staff is important particularly for the identified deprived speciality areas for the proper functioning of organisations. Some of the required competencies can be obtained through mentoring and health research management training. This could be done through actively twinning of universities and organisations through public-private, north-south and south-south collaboration. A conscious effort should be made to make information on training opportunities available to the non-government and non-academic sector.

Recommendation 9: Given the high disparity in fee schedules and the possible ethical and moral issues arising from poaching staff it may be necessary for the recommended independent Health Research and Ethics Council to review and set basic rules and standards in human resources for health research consultancy fees, staff recruitment and collaborative research without staff leaving.

Recommendation 10: Support the development of a structured Continuing Professional Development programme for health researchers focused on publications and dissemination e.g. peer review journals, blogging, public presentations, writing for print and electronic media and policy brief writing. This may be done through a south-south collaboration

Recommendation 11: Provide technical support to the Ghana Medical Journal to revamp the journal and increase its visibility and credibility nationally and internationally with a possibility of developing an additional national journal targeted at public health and systems.

Recommendation 12: Engage stakeholders to develop a national annual forum for Health Researchers-Policy Makers-Dialogue as a platform to promote interaction between researchers and policy makers. This will ensure that policy is based on evidence with contextual information from Ghana-based researcher

1   Background

1.1   Scope of work

The Department for International Development (DFID) is examining conditions for transitioning its international aid in Ghana. DFID considered health research and its use in policy development within the health sector important, and this needs to be strengthened and sustained over the transition period. To understand the state of research the Centre for Health and Social Services was commissioned to undertake a landscape mapping exercise of health research by DFID for Ghana. This is not focused on the quality of research but a broad understanding of what types or forms of research are being done in Ghana. The terms of reference outlining the scope for work is provided in table 1 below.

Table 1 Terms of Reference	
1	A review and synthesis of any existing research mapping exercises and analysis undertaken in Ghana identifying any changes made as a result of this previous work and where possible any identifiable effects of these changes.
2	Identify any major enablers and barriers to doing health research in Ghana including social, political, cultural and economic factors that affect where, why and how research is carried out?
3	Identify how research questions are identified and by whom?
4	Map the key institutions or groups undertaking and supplying health research in Ghana. The main areas of focus and strategic priorities (including geographic focus), if any, of these research groups or institutions. This needs to include a mapping of centres of research across the country and assessment of the links between centres and other research institutions.
5	Identify and assess the potential sustainability of existing research centres and networks and what partnerships exist with external sources e.g. donors, NGOs, research councils, etc
6	The main sources and distribution of funds for health research including external sources such as World Bank, other bilateral donors, and NGOs or foundations.
7	Identify the different types of research being produced – such as clinical trials, secondary data analysis, operational research etc.
8	Identify the individual sectors within health that research is being conducted in such as malaria, health systems, maternal health etc.
9	Provide a comparison of the Ghana health research sector with similar Middle Income Countries' health research sectors.
10	Identify the key forums through which Ghanaian health research is communicated and where researchers and users of research are brought together.
11	Identify specific areas in health research in which there might be particular strengths within Ghana.

It was further required that for each institution or research group identified the following should be provided:

    a. location and group name
    b. a short paragraph of background information on the groups' overarching research focus [and activity

c. information on why they have been selected
d. a web link
e. contact details (postal and central email addresses)
f. Whether the institution/group agrees to be contacted by DFID to notify of any forthcoming research opportunities

DFID provided two reports on research mapping from South Africa and Pakistan in order to help shape the methodology enable comparison and act as a guide on presentation of report.

1.2 Brief on Ghana

1.2.1 Ghana's socio economic profile

Ghana is member of the Economic Community of West African States (ECOWAS) has an estimated population was 24,658,823 in 2010 with a growth rate of 2.5% (GSS, 2012). The adult population consisting of people above the age of 18 years stands at 13.6 million, while dependent population, comprising people less than 15 years and above 65 years is pegged at 10.6 million. The total fertility rate is 4.0 and about half the population lives in rural areas. Life expectancy has increased from 58 years to 63.8 years in the last decade. Ghana's gross domestic product (GDP) was estimated at 44,799 million Ghana cedi in 2010 ($31,548.40 million USD) which moved the country into lower middle income country (LMIC) status with GDP per capita of 1,872.07 Ghana cedi ($1,318 USD)[1].

The country has a multi-party democratic system of government. A president is elected every 4 years with a maximum of 2 terms. The parliament is also elected every 4 four years with an independent judiciary. There are 10 administrative regions and they are Western, Central, Greater Accra, Volta, Eastern, Ashanti, Brong Ahafo, Northern, Upper East, and Upper West. The regions are sub-divided into districts to ensure equitable resource allocation and efficient and effective administration at the local levels.

Ghana has three main ecological zones – the coastal plain, the middle belt and northern savannah. The northern savannah is sparely populated with the coastal and middle belt densely populated. The major economic activity is farming in the rural communities while others are pastoralist, fishermen, traders etc. The three ecological zones turn to affect the health status of the population.

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[1] 3.42 Ghana cedi = 1USD

1.2.2 Ghana's health sector

Ghana has a long history of health sector reforms the recent of which dates from 1996 when the Sector-Wide Approach (SWAp) was initiated. SWAp was proposed generally to ensure that 'all significant funding for the sector supports a single sector policy and expenditure programme, under government leadership, adopting common approaches across the sector, and progressing towards relying on government procedures to disburse and account for all funds'; (WHO, 2006 p.4)

The reforms in Ghana caused fundamental changes in various policies and instruments designed to improve the function and performance of the health sector. As an approach to priority setting, aid and resource management, the reform set out mechanisms to ensure that donor sponsored projects are financed, coordinated and consistent with governments in the lead. The Medium Term Strategic Plan: towards vision 2020 developed in 1996 aimed to improve the overall performance of the health sector and to engender closer public private collaboration. Seven strategies were identified in the document which included prioritising primary health care along basic package lines, through decentralise management under a proposed Ghana Health Service, expansion of infrastructure, human resource development, intersectoral collaboration and improving financing. These elements were further translated into Medium Term Development Plans and annual programs of work built around five strategic objectives. These pertained to improving access, efficiency, quality, partnerships/collaboration and financing (MoH 1997).

Figure 1 Conceptual Framework for the Five year medium term plans towards 2020
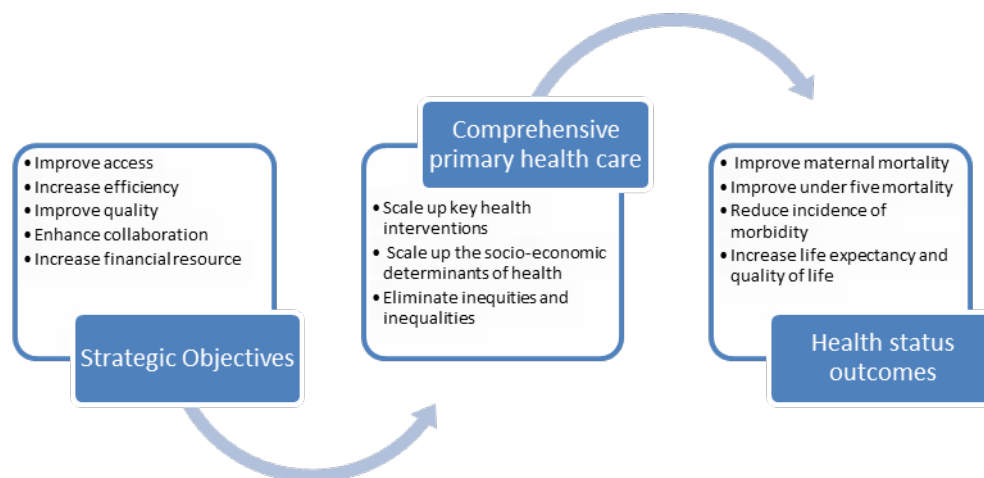
The table 2 below highlights progress in key indicators.

Table 2: Progress in essential health sector indicators

Indicator	Baseline 2008	2010	2011	2012	2013
Maternal Mortality Rate (MMR) per 100,000 live births	451	N/A	N/A	N/A	226[2]
Total Fertility Rate	4.0	N/A	N/A	3.8	3.8
HIV+ prevalence among pregnant women 15-24 years	2.2	<1.9	<1.8	<1.7	<1.6
Contraceptive Prevalence Rate (CPR) (For modern methods)	16.7	N/A	N/A	22.0	22.0
Institutional maternal mortality rate per 1,000 live births	196	185	170	160	150
% of pregnant women attending at least 4 antenatal visits	62.4	70.0	74.6	80.1	85.7
Infant Mortality Rate (IMR) per 1,000	50	N/A	N/A	<30	<30
Under 5 Mortality Rate (U5MR) per 1,000	80	N/A	N/A	<50	<50
Under 5 prevalence of low weight for age	13.9%	N/A	N/A	8.0%	8.0%
% children 0-6 months exclusively breastfed	62.8	N/A	N/A	70.0	70.0
% deliveries attended by a trained health worker	39.4	50.3	55.6	60.2	65.0
% of U5s sleeping under ITN	40.5	50	65	70	75
% of children fully immunized by age one - Penta 3 (DTP3 Hib3HepB3)	86.6	87.9	89.0	91.4	93.5
TB treatment success rate	84.7	86.0	88.0	89.0	90.0
% population living within 8km of health Infrastructure	N/A	N/A	N/A	N/A	N/A
Doctor : population ratio	1:13,449	1:11,500	1:10,500	1:9700	1:9500
Nurse : population ratio	1:1,353	1: 1,100	1:1000	1:900	1:800
% total MTEF allocation to health	14.9	11.5	15	≥15	≥15
% non-wage GOG recurrent budget allocated to District level and below	49	50	50	50	50
Per capita expenditure on health	23 (US$	26(US$)	28(US$)	30(US$)	31(US$)
Budget execution rate (Item 3 as proxy)	97%	≥95	≥95	≥95	≥95

Source: Compiled by the Centre for Health and Social Services from Ministry of Health Annual Performance Review Meeting Presentations 2012 and 2013.

The trends observed raise questions on why and how as subjects of possible research. Ideally this should find place in the natural health research agenda. However as can be seen later this was not the case.

HIV prevalence has been steadily dropping over the past five years among pregnant women aged 15-24 years declining to 1.6% in 2013 from 3.6% in 2003. Antenatal care coverage is 86% and skilled attendance has improved from 39% in 2008 to 65% in 2013. Penta 3 which serves as proxy for measuring complete immunisation is 94%. The equity index for poverty in relation to under 5 mortality is 1:1.5. From the data there is inequity in the distribution of human resource and access to health services.

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[2] MDG targets using 2007 Maternal Mortality Survey as baseline
* These figure was questioned in Ghana National Health Insurance- views on progress, observations and commentary by Seddoh , A et al 2011

1.2.3 Organisation of services and financing

To improve universal access for all, health interventions are packaged and delivered right from community settings with referrals where possible to health centres in the sub-districts, hospitals in district, regional, tertiary and teaching hospitals.

Figure 2: Organisation and financing
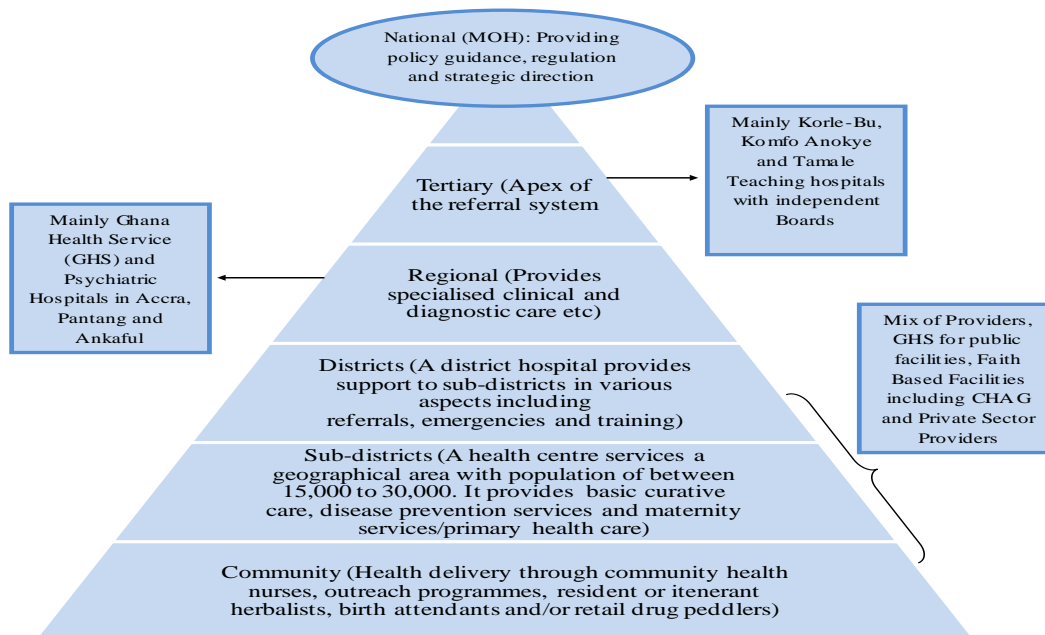
The health sector in Ghana is financed through Government of Ghana (GOG) revenues, social or private health insurance, out-of-pocket payments, and international funds from development partners.

Public funding for health increased sharply from US$201.41 million in 2005 to US$662.92 million in 2010. General revenue amounted to US$180.66 million, constituting 89.7 percent of public funds in 2005. This decreased to 58.07 percent in 2010. Funds from the NHIF increased from US$20.75 million in 2005 to US$277.94 million in 2010 (MoH, 2013). Between 2005 and 2010, donor funds fell significantly from US$360.48 million to US$178.93 million. The impact of these reductions in resources on health research became evident during this survey and captured in this report.

Figure 3: Changes in proportion of funding sources to the health sector
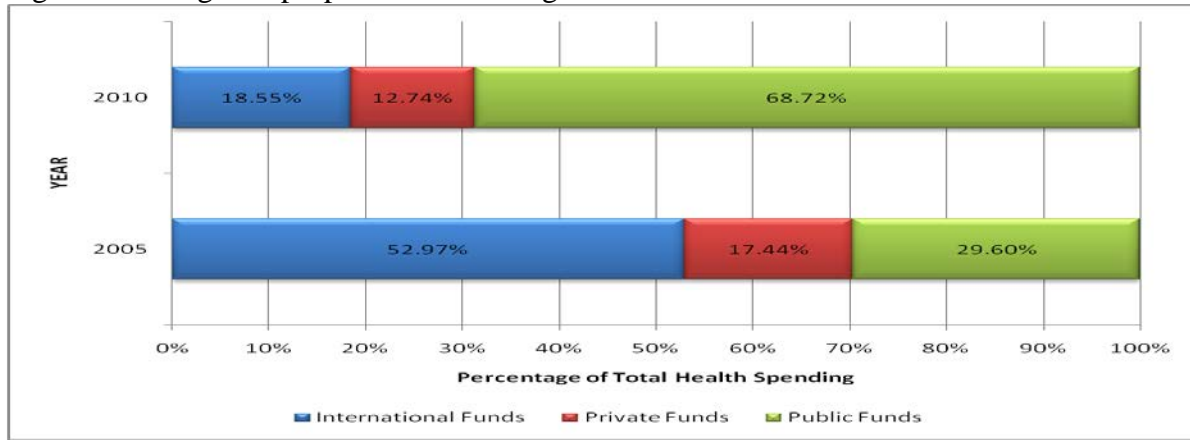
Source: Ministry of Health National Health Accounts, draft report December 2013

In summary, financing has seen increases in absolute terms in recent years although the health sector is losing ground as measured by percentage of total spending compared to other African countries.

Figure 4 Health spending as proportion to total government spending
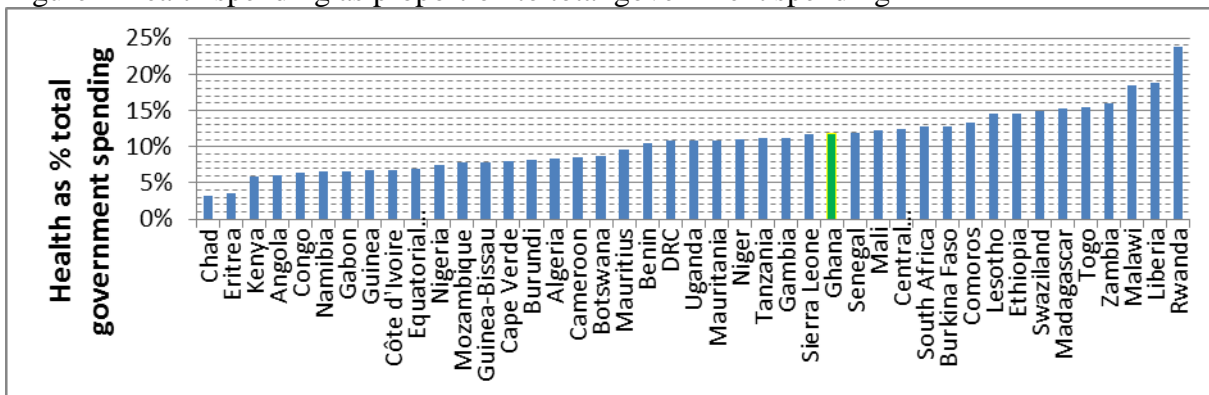
Source: State of Health Financing in Africa, World Health Organisation, Africa Region, January 2013,

The proportion of funding from public funds, private funds and international funds has changed dramatically over the last five years and can generally be characterized as a shift from international funds to Ghana public funds. There are many new actors and changing financing structures with less donor financing of the health system and the NHIS becoming the main financing agent.

2   Methodology

2.1   Defining health research

Defining what counts as research is a difficult enterprise. Some have defined health research as a structured field with conceptual underpinnings. The Institute of Medicine (1979) articulates health research as an "inquiry to produce knowledge about the structure, processes, or effects of personal health services. A study is classified as health services research if it satisfies two criteria: it deals with some features of the structure, processes, or effects of personal health services; At least one of the features is related to a conceptual framework other than that of contemporary applied biomedical science" (p. 14). The distinction observed is between health research and biomedical science. This is not easily discernable except that it may be considered as drawing a difference between enquiry and demonstration science. Nonetheless it ties research appropriately to knowledge generation.

Steinwachs (1991) defined health services research as "…a field of inquiry that examines the roles of organization, finance, manpower, technology, and prevention in the provision of health care services, and their impact on utilization, cost, and quality of care. The Steinwachs analogy draws on many disciplines to address this breadth of research, including biostatistics, epidemiology, health economics, medicine, nursing, operations research, psychology, and medical sociology (p.10). For those involved health systems research typically health research might involve testing new drugs, vaccines, surgical procedures, or medical devices in clinical trials or understanding how health systems and policy impact on health service outcomes (Sheikh et al., 2011).

2.2   Types of research

Analysing the research landscape requires understanding the classifications of types of scientific research. These include fundamental and applied research, Health Technology Assessments, and the policy field for which the research is relevant. Stokes et al (1997) divides research into four quadrants (see table 3).

Table3: The quadrant model of scientific research

Inspired by:		Ultimate Utilization	
		No	Yes
Quest for fundamental understanding	Yes	Pure basic research (Bohr)	Use-inspired basic research (Pasteur)
	No	-	Pure applied research (Edison)

Source: Stokes et al 1997, p. 71

Pure fundamental research is placed in the Bohr quadrant. Fundamental research is experimental or theoretical work that is primarily undertaken to generate new knowledge about underlying phenomena or observable facts. It is called 'fundamental' because the aim of the research is to obtain new understanding, without there being a precise application in mind.

The results of fundamental research are often specific and are ascribed a relatively high authoritative value. Basic research is externally valid at global level and is in comparison with other kinds of research, largely free of normative assumptions. Utilising the results of pure basic research, for example in health care, is often still a bridge too far. These are usually clinical and other applied research requiring many of years research before the results can be translated into improved human health.

Research that directly links to product use is placed in the Pasteur quadrant. Much of present-day scientific research fits in this quadrant. This includes disciplines where practical problems and economic possibilities have considerable direct or indirect influence on the research agenda (Nelson 2004). Much health research is situated in this quadrant, e.g. biomedical and pharmaceutical sciences and biotechnology. Clinical research in the health care sector can often be placed in this quadrant. It is often a combination of obtaining new understanding within the use context (the clinical setting). Research that fits in the Pasteur quadrant is usually more suitable for immediate use than research in the Bohr quadrant.

Applied research is more often based on a research agenda from outside the scientific world than basic research. Those financing applied research are often also potential users (Janovski and Cassels 1996). There is some evidence of above-average use of Health Technology Assessments (HTAs), in which the effectiveness and the cost-effectiveness of care modalities are the focus (Battista 1992, Tugwell et al 1995). HTAs are often initiated by policy makers and often offer a quantitative answer to specific health care questions (Jacob and McGregor. 1997). From a national perspective, it can be suggested that a balanced card reflecting each of the quadrant will be a desirable portfolio.

Use of research appears to be dependent on the type of policy within which the results have to be applied. There is however no consensus when it comes to a division of types of policy that influence the use of research. Hanney et al. (2003) distinguish between national policy in health care, local/regional policy of health-care institutions and policy made by organisations of health professionals. Some authors distinguish between legislative policy, administrative policy and clinical policy which in many cases come down to distinguishing functional responsibilities and content of services.

2.3   Dissemination of research

The standing argument in the dichotomy between research and policy is that researchers do not communicate effectively to the end user. This is the crust of the two communities' argument (Amara 2004). The community of scientists is accused of being in their own world while the policy community is faulted for not being able to obtain, understand and use research results. Knowledge translation has become a term introduced to absorb the key elements required for effective communication of research results and to bridge the gap between the two communities.

WHO defined *knowledge translation* as: 'the exchange, synthesis and effective communication of reliable and relevant research results. The focus is on strengthening/enhancing interaction between the producers and users of research, removing barriers in the way of research and tailoring information for different target groups so that effective interventions are used more.' (WHO 2004). The WHO definition is a bit broad and focuses on the barriers without saying how to do the communication effectively and efficiently.

Choi (2005) is more pragmatic and emphasised the principle of integration and simplification of evidence in a constant flux of interaction between the two communities integration also being Egger et al's (2001) solution to complex evidence communication. Schryer-Roy (2005) cites the successful use of antiviral drugs against HIV/Aids in Free State province of South Africa as an example of a successful use of interaction and integration and demonstration how scientist helped policy makers to successfully use research results in implementing the use of antiviral drugs to fight HIV/Aids. According to the author, this resulted in arriving all based decisions, leading led to more effective policy and interventions.

2.4   Definition and types of research as used in this study

We define health research as a systematic enquiry aimed at understanding diseases or health conditions and finding new technology or better systems to promote, prevent, treat, rehabilitate or finance them. We adopted Stokes et al (1997) quadrant model of scientific research as a framework for classifying types of research. To be included in this study the health research process must meet what we termed the '*test of systematic evidence*' defined as: use of stepwise approach in interrogating health service delivery questions; and using a single or multi-disciplinary scientific enquiry methods that can be replicated for validity.

Program monitoring reports even if commissioned did not qualify as research under this study. Evaluation studies may be included provided they satisfy the basic criteria outlined for the test of systematic evidence. Though essential the social determinants of health which comprises all those determinant elements captured in the WHO Commission on Social Determinants of Health was not included.

2.5   Conceptual framework for analysis

There is expansive literature available conceptual framework that could be drawn onto guide health research landscape mapping. Ghaffer et al (2008) reference McIntyre's research capacity conceptual framework that had different environments interacting with each other to influence the development of research capacity in countries. The framework creates a nexus between task networks and their interaction with the institutional, national and external research environments in a country. It also enables an understanding of the possible role of government in allocation efficiency including 'coordination, funding and creation of the demand for research to solve the health systems' problems'. What was missing was the possibility that research funding can also

flourish enterprise environment thus allowing for different goals and priorities outside government to determine fund flow and resource allocation may be coordinated.

A framework for the Bangkok Conference on Health Research for Development (COHRED, 2001) generated analysis on the functions of a national health research system. Pang et al (2003) proposed a list of major functions for a national health research system. They suggested that any analysis of health system should involve 'the people, institutions, and activities whose primary focus is to generate high quality knowledge that can be used to promote, restore, and/or maintain the health status of populations. It can include the mechanisms adopted to encourage the utilization of research' (p. 1). The emphasis is on use of research and data protection. To enrich context we turn to Decoster et al's (2012) work which provides opportunity to include voice and give meaning to context. This work drew on ethnography to allow researchers and patrons to provide a narrative of their lived experiences beyond artefacts.

Previous work in mapping research in Ghana by de-Graft Aikins, (2010a) and Bennett et al., (2011) examined think tanks in the context of health policy and research systems community in Ghana and Africa. Adjei and Gyapong (1999) of the Ministry of Health (MoH) also prepared a report for COHRED as part of the ENHR project. These studies outlined the history, context, and status of health research in Ghana, with a view towards increased mainstreaming of research within the MoH. De-Graft Aikins (2010b) also undertook a scoping study of eight countries, designed to include a suitable and diverse geographical and linguistic range within Sub-Saharan Africa on health policy and systems research. On probability of possible research areas we drew on studies by Somber et al's study in 2013 and Hofman et al (2009). These studies examined health research institutions in West Africa and South Africa respectively providing an indication various elements of import and boundaries to thematic topics to be searched.

The above literature suggests that the research environment is global, national and institutional requires specific competencies. Research groupings may respond to influences, changes and events. These become platforms and may realign prospectively – forward, or retrospectively - backward to achieve their research goals. Changes of events at any platform will affect or influence activity and response in others immediately or over time. We recognise that different organisations may undertake research but not all institutions have research as core function. Base on these understanding, we developed the conceptual framework as in figure 5 to guide our landscaping.

Figure 5: Conceptual framework for health research landscape mapping
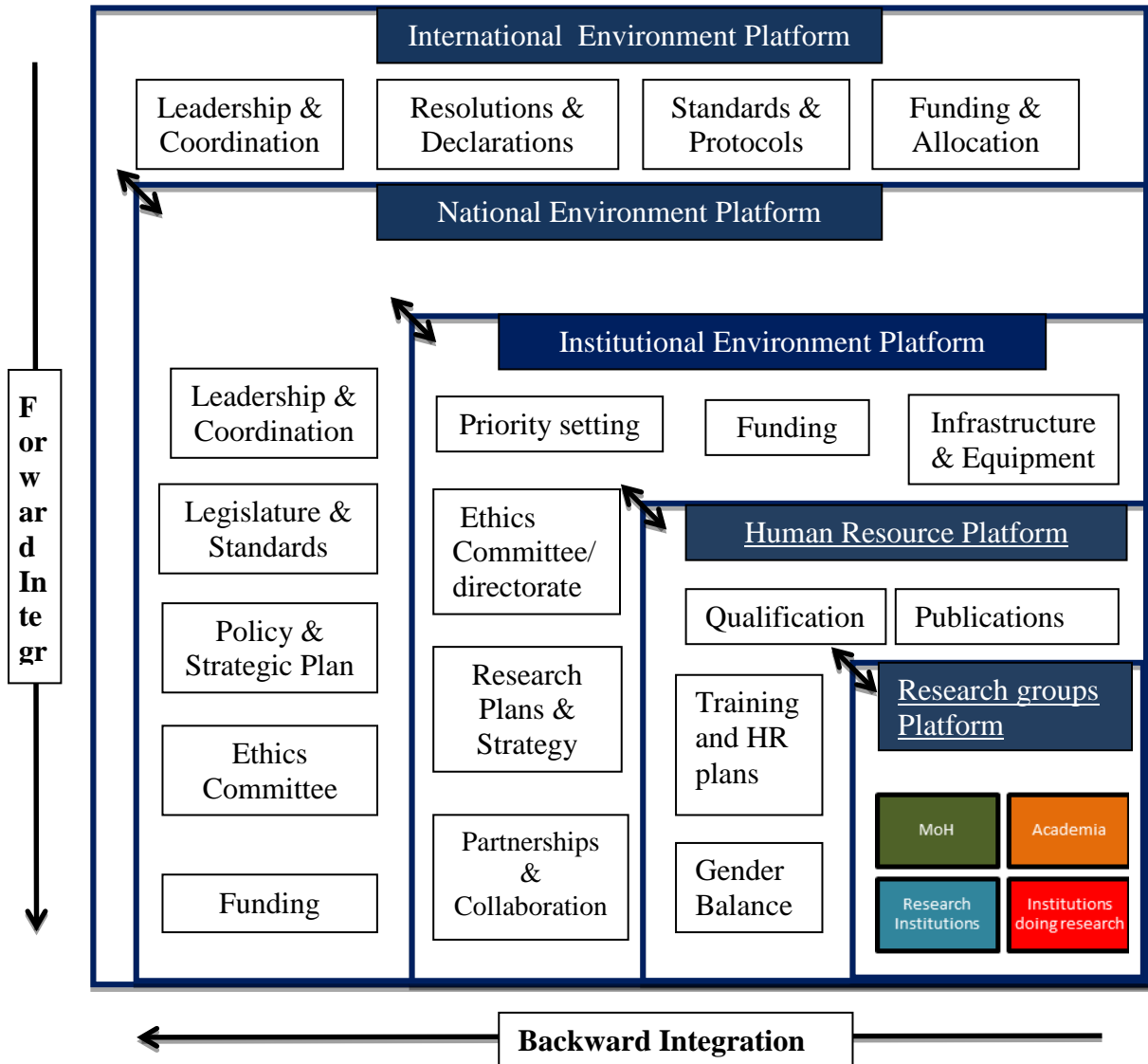
Broadly a platform encapsulates all the relevant activities that come together to define the health research landscape of that particular setting. For example at the Institutional Environment Platform we expect that the institution will set research priorities, develop strategic plan to guide its implementation, pass each proposal through an in-house ethics committee, develop the needed infrastructure to support research, seek funding and develop partnerships and collaboration to achieve efficiency. The components in the platform draw on the International Environment Platform to guide the details of each component while the Human Resource Platform will have direct effect on skills available generally for effective delivery.

2.6   Literature and documentary review

We conducted a data search of materials available in libraries of the Centre for Health and Social Services, the University of Ghana schools of medicine and public health and the Research and Development Division of the Ghana Health Service. Relevant articles were also obtained from known colleagues by sending those e-mails requesting if they had any publications on the subject that they might be able to share. This yielded limited results. Only two publications were received.

Additional articles and publications were obtained by searching online data sources including PubMed, HINARI, WHO Health Information System (WHIMS) and the General World Wide Web focusing on Google Scholar and Google. We used various terms and their permutations as follows: "Health Research," "Health Research Systems," "Access to Research Funding," "Utilisation of Health Research" "Health Care Research," "Health Research Capacity," "Health Research Capacity" and "developing countries health research", "Health Research in sub-Saharan Africa", "Health Research in WHO Africa Region", "clinical trials"; Health systems research" etc. These yielded articles, books, reports and peer reviewed journals. The peer review journal articles provided links to bibliographies that generated more articles for analysis. Articles were selected from these searches based on their relevance to research landscape mapping in general and to Africa in particular. We also looked for publications that will provide a basis for middle income comparison. We eliminated information whose source we could not authentic such as internet posts without appropriate referencing or author full name and those that did not relate directly to the region.

2.7   Database of Health Research Institutes

The database of health research institutions was compiled through searching the following databases:-

- Research Ethics Committee website
- Ghana Coalition of Non-Government Organisations in Health database
- Research Development Division (formerly Health Research Unit) of the Ghana Health Service
- Global Development Network list of organizations (featured under "partners" tab on the GDN website)
- List of health "organizations" on the Eldis website
- Website of known organisations in health research

In addition to these databases we searched (i) the websites of relevant networks (such as Equinet, ECOWAS, and the Africa Health Economics and Policy Association and (ii) applicants to Health Project calls of the STAR Ghana project and the Ghana Dutch collaboration project. In addition

individuals we considered well informed about the organizations working on health research issues in low and middle income countries were also approached and asked to review emerging lists. Criteria for inclusion in the database were (i) the organization matched the definition of a health research presented earlier (ii) the organization was located in a Ghana.

We mapped the key institutions or groups undertaking research in Ghana by extracting data on each institution (mission, functions, year established and location, web address, and organizational form)from web sources (primarily the institution's own website) and included in the database. We used the survey and in-depth interviews to fill in gaps and validate information. The final excel database is available separately.

For bibliographic analysis we requested institutions to provide names of the three top-most experts. We then keyed in their names into our search data bases and into google and google scholar search. The purpose is to determine through the web international presence of the nominated expert. We focused on their publications and contribution to knowledge as well as ability to mentor young professionals in the area of professed expertise. To achieve this we used the proxies 'lead author' to represent contribution to knowledge and 'last author' to denote mentoring and set these against frequency. Mentoring provides a sense of developing the next generation of experts. The limitation of this approach however is that we are unable to validate if the engagement among the various authors is a continuing function or simply a one-off collaboration.

2.8   Survey methods

Online survey method: Using the institutional database developed we sent out a structured questionnaire to institutions with complete email addresses using a web-based online package http://www.surveygizmo.com/s3/1652363/Research-mapping-study-of-the-health-sector-in-Ghana/SG. A total of 85 institutions were included in the online survey and received responses from 43 giving a rate of 53%. The respondent reflected the general characteristics of the total sample. A high rate was achieved because we actively followed up with phone calls to ensure encourage the institutions to respond to survey request. The on-line survey was closed a week prior to the in-depth interviews.

In-depth interviews: We conducted interviews with senior health systems researchers, high-level policy makers and policy brokers in thirty-three (33) institutions. The institutions were carefully selected to include academia, research institutions and organisations doing research, with each of the three categories of interviewees' potentially holding different opinions. These were from the northern, middle and southern ecological zones and represented different curves of economic development. The north being lest developed.

Data was collected using a structured open and close ended questionnaire through a combination of telephone, Skype, and in-depth face-to-face interviews. The aim was to seek narratives vignettes and stories that gave insight into research activity and funding and how the research-policy continuum conceptualises health systems research, interpret researcher and policy maker roles, scope of health systems research undertaken, and potential policy uptake.

Validation Process: A technical Advisory Group (TAG) of renowned researchers was established to guide the design of this study and critic the findings. The final draft was reviewed and provided essential comment to ensure that the document reflected the landscape of health research in Ghana

2.8   Limitations

This study is limited by the time available for undertaking the landscape mapping and the response rate. We were able to cover all the MoH agencies who responded positively to the study. We reached out to the 14 known academic institutions with programs in health but only three responded at the time of writing this report. The depth of information each institution was willing to share also affected the profile developed. Financial information was difficult to get. On the whole however these did not significantly affect the quality of information available. The spread of institutions that responded fairly represented the characteristics of the entire landscape of research institutions. The results of the study was subjected to rigorous review by the Technical Advisory Group and a stakeholder meeting to ensure that it is a fair reflection of the health research landscape in Ghana. The findings therefore may be reasonably generalised.

3. Findings: Research Landscape of Ghana

3.1 International Environment

The World Health Organisation is the global technical lead organisation for health. Article 2 of the 1946 Constitution of the World Health Organisation called for a 'boost and guide research in the area of health'. The World Health Organisation Africa Region in an attempt to correct the situation adopted a strategic health research plan for the region through resolution AFR/RC48/R4 (WHO, 1999). The resolution urged countries to determine national priority research areas; draw up national research policies and strategies; build national health research capacities, particularly through resource allocation, training of senior officials, strengthening research institutions and establishment of coordination mechanisms, develop a national health research plan; and establish a national ethics committee to ensure compliance with international ethical standards especially regarding the conduct of clinical trials on humans.

The World Health Report 2013 (WHO, 2013) capture the recent growth in health research and states that 'A greater recognition of the value of research for health, society and the economy has added impetus to the upward trend' (p. 31). The report noted that health research continues to flourish in developed countries with only marginal growth observed in middle income and developing countries. Until Somber et al's study in 2013 written health research policies and legislation are not a common occurrence in the ECOWAS Region countries. Eight countries according to Kirigia and Wambebe (2006) had a health research policy. Only Mali reported having a law on health research with 90% of countries studied not having any framework 'protecting the integrity, dignity and safety of human research subjects'. The situation has improved in the findings by Sombre et al 2013 where 'health policy and a strategic health development plan existed in 12 (85.7%) of the 14 ECOWAS countries surveyed, and R4H (research for health) was broadly taken into account in these documents in all these countries. Only eight countries had specific R4H policy and strategic documents, while seven countries had specific documents on health research priorities' (p 6-7).

A common weaknesses of health research activities in Africa is low national funding (Kirigia and Wambebe, 2006).The 58th World Health Assembly in 2005, through resolution WHA 58.34 urged Member States to 'invest at least 2% of national expenditures in research and research capacity strengthening, and at least 5% of project and program aid for the health sector from development aid agencies should be earmarked for research and research capacity strengthening' (WHO 2005). This recommendation was first made by the Commission on Health Research for Development (COHRED 1999). Only a third of the ECOWAS countries had mechanisms in place to help implement these recommendations (Sombre et al, 2013). Ghana is not one of them.

3.2 National Environment

3.2.1 Post-independence development of health research systems in Ghana

The Danfa Project in 1970 and the Brong Ahafo Rural Integrated Development Project were considered the initial effort to implement research that addressed health systems as well (Adjei and Gyapong, 1996). The Noguchi Memorial Institute for Medical Research (NMIMR) established in 1979 NMIMR had the vision of becoming a world class Institute capable of conducting high quality cutting edge research and training in the biomedical sciences. Other initiative such as the Traditional Birth Attendants Operations Project, The Vitamin A Supplementation Trial (VAST) and the WHO Health System Research Project were all important events in the history of health development in Ghana. However the 1982 Report of the Commission on Health Research was considered inspirational in charting the future course of health research in Ghana (Wondergem, 1990).

Ten years after the COHRED report Ghana developed a framework of Essential National Health Research that led to the development of a '5 year Policy Frame work on Research for Development' in 1992 (MoH, 1992). The document set out the mechanism for establishing a research agenda for the Ghana health sector, the mechanism for capacity development and for coordination of research. As part of the implementation structures the national Health Research Unit (HRU) was formally established in the Ministry of Health with a full time Director in 1994. In addition three field research centres - Navrongo, Dodowa and Kintampo - were planned and established. Funding was provided by the Government of Ghana and the then British Overseas Development Agency, the WHO Health Systems Research Division and the Council for Health Research and Development (COHRED). Under this program, extensive training in research using the WHO Health System Protocol Development and Analysis Manual was undertaken. Teams were set up in all ten regions each of which implemented research that responded to their need for information (Adjei and Gyapong, 2001).

3.2.2 Lessons from the Ghana-Dutch Research Collaboration

The Ghana-Dutch Research Collaboration is a product of the Health Research Project (HRP) initiated by the Netherlands Development Assistance Research Council (RAWOO). The first meeting between the Health Research Unit of the Ghanaian Ministry of Health and the RAWOO took place in April 1996. After three and a half years of extensive consultations the HRP started early 2000. The aim of the HRP was to generate research information that would assist the health sector to improve health care in Ghana with the potential end users of research as the target of any research conducted. To do this the HRP had to identify knowledge gaps, and produce the knowledge required to improve the health sector, strengthen research capacity, develop North-South cooperation and enhance access to and use of research findings. The program was financed fully by the Netherlands Directorate General of Development Cooperation.

The Health Research Unit (HRU) of the Ghana Health Service served as the executive secretariat of the HRP. The executive secretariat consists of a program director, two research coordinators, a secretary and an accountant. The Joint Ghanaian-Dutch Program Committee (JPC) is responsible for the HRP, making policy decisions and awarding funds. The JPC consists of three Ghanaians representing academia, policy makers, care providers and NGOs, and three Dutch scientists with backgrounds in health, biomedical and social sciences. The Support and Liaison Office in Netherlands offers assistance to the executive secretariat and facilitates the involvement of Dutch researchers in the program. Enyimayew (2003) reviewed the implementation of the Ghana-Dutch Research Collaboration and concluded the following.

- Research agenda

The research agenda is consistent with the health sector priorities as it was directly linked with the second Medium Term Health Development Plan (2007). Quality of Care and Health Financing topics dominate the list of research proposals. There was a relative neglect of decentralization and efficiency issues; only 2 (4%) of funded proposals fell under these categories. Overall, about 1 in 5 (22%) of Letters of Intent (LOI) submitted were funded as in figure 6 below. Details of funded proposals during the first two calls are provided in Annex A.

Figure 6 Outcome of review and approval process of research proposals
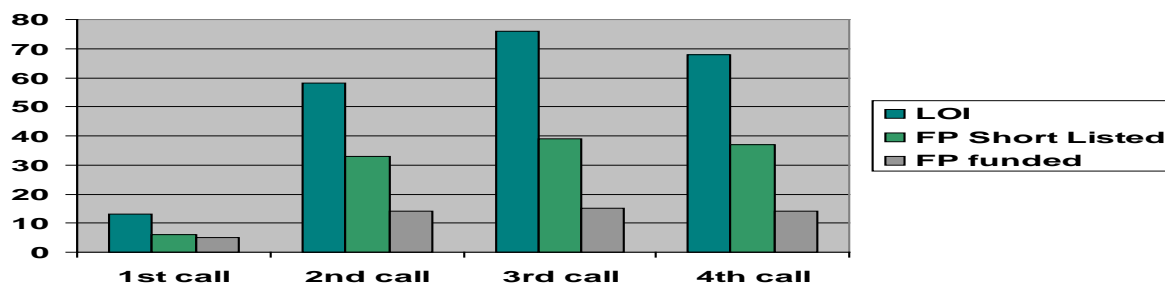
The composition of participants at the agenda setting meetings excluded community and client representation and the private-for-profit sector. This contributed to the smaller proportion of research topics originating from these constituencies.

- Capacity enhancement

Among the three key areas targeted for capacity enhancement, human resource development was the most successful activity implemented. The training programs impacted positively on the quality of research conducted. Different categories of researchers however indicated a need for more specific skills enhancement including qualitative research methods and presentation of findings to busy policy makers and other specific audiences. The number of trained researchers

was considered inadequate to conduct research to inform policy and to improve health service delivery.

Storage, retrieval and updating documents were neither complete nor timely. The use of Internet for documentation, information support and communication was weak at all levels. Large scale formal dissemination activities with complete documentation were not carried out throughout the entire project lifecycle. The joint research program has so far not been able to attract the private sector to the research activities.

- Resource mobilization and use

The partnership project had a 5-year budget of €3.4 million. MOH contributed in kind support in the form of accommodation and cash staff salaries. Expenditure was low as in table 4.

Component	Budget (€uro)	Expenditure (% of Budget)	Unspent budget in (€)
Year 1	679,965	1.1	672,615
Year 2	679,965	28.2	488,335
Year 3	679,965	34.6	444,397
Year 4	679,965	52.0	326,124
Year 1 – 4	**2,719,860**	**29.0**	**1,931,472**

Source: Enyimayew, 1996

The main reasons for under-spending include; a slow start in Year 1, the relative few numbers of funded proposals, non-funding of commissioned research (these have higher unit cost) and delay in implementing key activities (e.g. large scale dissemination meetings).

- Management

Program management has several strong points. Functions and responsibilities, organizational structure and relations and procedures for assessing support for research were clearly spelt out and well documented in a *Standard Operating Procedures* manual. The inclusion of legal, ethical and financial implications for researchers and management and the extent to which they are applied illustrates the seriousness with which the whole program was implemented. All managers worked part time for the program. Major shortcomings included incomplete documentation and shortfalls in dissemination targets. From call for proposals to grant making cycle under the Ghana-Dutch Collaboration took at least 14 months. This was considered too long.

- Partnership

Commitment to planned activities based on mutual trust, respect and transparency were seen as hallmarks of the partnership. On the whole however there was lack of clarity of what "partnership" was supposed to achieve. The Dutch partners were driven by interest and commitment of individuals rather than engage on institution basis to promote long term relationship with Ghanaian institutions.

3.2.3   Current state of research environment

Our finding from the field show high awareness among researchers on international policies supporting health research. Above 70% of those interviewed easily referenced the Algiers declaration and the World Health Organisation resolution WHA 58.43 as commitments to research. There is no law on health research .The Ministry of Health is generally acknowledged as having de facto responsibility for coordinating and providing leadership for setting national research priorities, standards and regulating conduct of research country-wide.

An Ethics Review Committee was established in 2003. In 2004 the Health Research Unit of the MoH relocated to the Ghana Health Service following the appointment of its Director as Deputy Director General of the Ghana Health Service. He retained the function within the Ghana Health Service. A new Head of HRU was designated under the Division of Policy Planning, Monitoring and Evaluation under the Ghana Health Service. In 2006 The Ministry of Health as part of the structural recommendations of the Civil Service created the Research, Statistics and Information Management Division of the Ministry and appointed a new Director to the Division to coordinate health research and information management.

The process of national health research priorities setting developed under the first 5-year Medium Term Health Development Plan which served as a platform for earlier interventions was discontinued. Several attempts to develop and adopt a new National Health Research Policy had not been successful with most respondents expressing disappointment at the absence of a national policy. A research institute respondent interviewed stated:

'The health sector is blind to health research. How do we direct what research is necessary without having a general policy of a sort? Frankly they [MOH] have little or no respect for research. They talk more than they do … politics rather than science is what drives decisions'

In 2010 a draft National Health Research Strategy was developed (MoH, 2010). The document had the following highlights:

- Outlines systems, operational and clinical research linked to the objectives of the Medium Term Health Development Plan
- Intended to set aside 2% of non-wage recurrent budget as health research fund and affirmed by sector aide memoir signed by government and development partners (MoH, 2010). This was an attempt to implement WHA 58.43 but was not realised
- Intended to train at least 4 researchers annually at Mphil or PHD level. In an interview with the Director of research one person had already graduated with a PhD under this reference and the Director is in the process of acquiring one

In 2013 the annual programme of work of the Ministry of Health (MoH, 2013) under its objective to "strengthen governance and improve the efficiency and effectiveness of the health system" aimed to through the public sector research institutions conduct ten (10) operational research, provide continuing professional development training for ten researchers and ensure that research staff are engaged in at least one clinical trial. There were no particular thematic or intervention areas of emphasis or indication of how the research activities will be organised.

The governance of clinical trials is placed under the Food and Drugs Authority by virtue of the Public Health Act 851, 2012. Part seven of Act 851 defines the requirements for undertaking clinical trials and how this might be regulated. The Food and Drugs Authority has received, reviewed and approved applications for clinical trials as shown in the table below.

Table 5 Number of applications processed by the Food and Drugs Authority

Year	Vaccine-Related CT Applications Received	Vaccine-Related CT Applications Approved	Allopathic drugs CT Applications Received	Allopathic drugs CT Applications Approved	Medical devices CT Applications Received	Medical devices CT Applications Approved
2009	2	2	8	2	0	0
2010	2	1	7	6	0	0
2011	1	2 (1 from previous year)	4	4	0	0
2012	0	2 (both from previous years)	1	1	0	0
2013	0	0	5	2	3	2
2014	1	0	5	1	2	1
2015	1	0	0	0	0	1(from previous year

Source: Food and Drugs Authority

The Health Research Unit having transformed into the Research Development Division in the Ghana Health Service in 2009 retained the function of ethical review of all GHS research proposals. In the absence of a national health research ethics council the GHS Ethics Review Committee responded to requests from other institutions requiring ethical clearance for external

funding or institutions seeking to undertake health research in Ghana. Most protocols reviewed are from health-related institutions though some were received from other non-health institutions such as the Anti-Corruption Coalition (GACC), Ghana Sustainable Change Project, Human Rights Advocacy, Socio-economic and Entrepreneurial Development Centre and the World Food Program which were reviewed. The Committee also reviewed protocols from various tertiary institutions in and outside Ghana. Examples are University of Ghana, University of Cape Coast, Kwame Nkrumah University of Science and Technology, Ashesi University, Johns Hopkins University and London School of Hygiene and Tropical Medicine.

Initially reviews were done for free. This changed in May 2014 with the introduction of fees ranging from GHC50 - GHC3000 (approximately GBP 10- GBP600) depending on the type of protocol to be reviewed. The Committee met at least once every two months in the past year. One Thousand Two Hundred and Ninety (1,290) protocols have been reviewed by the committee over the 10 years of its existence.

The extended reach of the Ghana Health Service Ethic Review Committee gave it the semblance of a national ethic review committee though technically it was not set up for that purpose. This led many interviewees to assume that the GHS housed the national ethic review board. The respondents suggested that the ethical review function should have been either an independent body or a function under the Ministry if a situation of conflict is to be avoided. An interviewee commented.

"I am concerned that the ethical review board will lose its neutrality under a government agency. You know that the research division (Research Development Division of the Ghana Health Service) also does research. How can it both serve as a secretariat to the board (meaning the Ethics Review Committee) and realistically review its own proposals or that of government institutions under the Ghana Health Service" – An academic institution respond

Some respondents expressed disapproval of the current arrangement:

"... This is a joke. We are not serious because we do not pay adequate attention to ethical review. The Ghana Health Service cannot realistically claim to have the best ability to constitute and manage an independent review council. As for us we have our own so we do not submit proposals to them. It has to be truly independent for us to respect it. We have more qualified people out there and if we are serious we need to get it separate from government to include even the private sector" – private research institution respondent.

From the proposals submitted and database the following profile of types of research in figure 7 was realized.

Figure 7 Types of Research

Type	Percentage
Clinical trials	13%
Microbiology Laboratory based	10%
Operations Research	21%
Health Systems research	41%
Biomedical research	4%
Public Health	6%
User of Research Findings	2%
Ethnographic Studies	1%
Assessment of environment matrix	1%
Basic research	1%
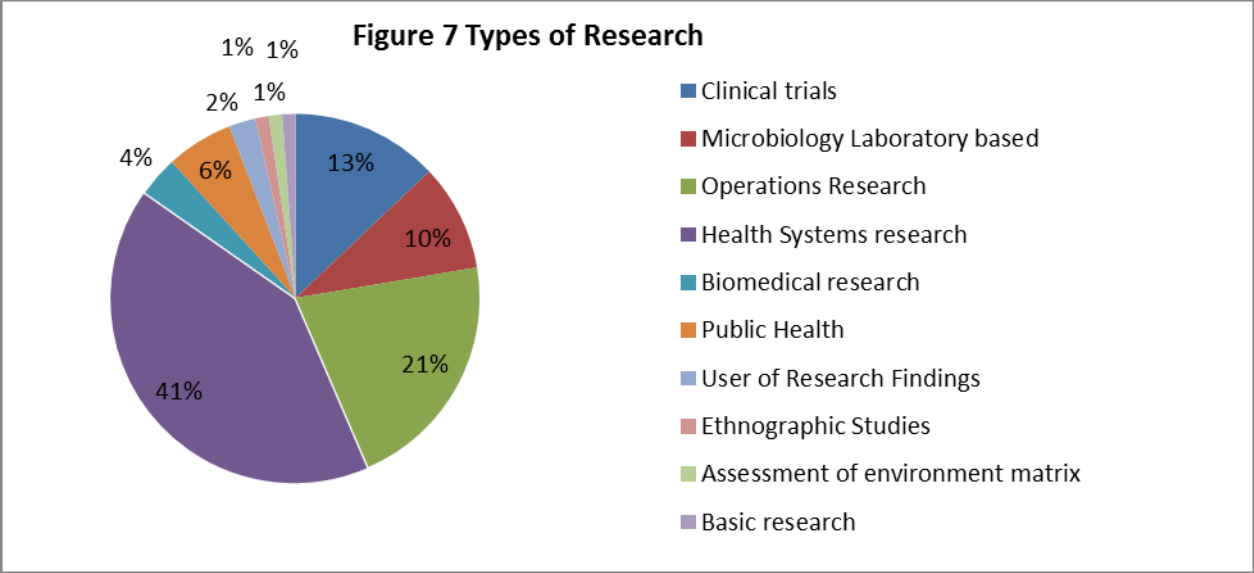
An analysis of the top two areas of research proposals mentioned by individual interviews yielded the following.

Table 5: Topmost areas of research

Topmost areas of research **Top 5**	**Next 5**	**Others**
Malaria	Health Insurance and financing	Environmental health and risk assessments
HIV/AIDS	RH and Adolescent Health	Health information systems
Maternal and Child Health	Micro filarial – LF, Onchocersiasis	NCDs – hypertension; anaemia; mental health
Tuberculosis	CHPS	Water and sanitation
Worm Infestations	Mobile technology	

Sometimes the research areas included multiple themes.
- Maternal and child health, CHPS, Malaria
- Maternal Health, mobile technology and CHPS
- Worm infestations and environmental health

Most research fell in the fundamental research and applied research of Stokes (1997) quadrant. These focused on the epidemiology, coverage, intervention and cost effectiveness and impact of health technology.

The various topics closely mirror the key performance indicators tracked by the health sector as in shown in table 2. There was however no deliberate or systematic link between the indicators and researcher choice as various issues became subjects of research for different reasons. The follow examples of quote provide some insight:

"It has to do with the problems we are confronted with in the Northern sector of Ghana. In our annual review, we usually review what activities we have done and present to Accra. We look at issues they are really prevalent. We try to look for funding. You know all what we do is dependent on funding from donors. Ghana government does to provide funds for research so the funding influences what we do. We have a catalogue of what we intent to do in a year but has to respond to the calls that are coming, so we go for funding opportunities that address diseases problem here" - Academic institution respondent

A respondent from Kintampo Research Institute in the northern zone of Ghana provided a community level engagement dimension on how they set their research agenda as follows.

"For instance we have what we refer to as demographic surveillance. We have a system and we are able to contact every household in our catchment area. We always go through what they say to find out knowledge issues. So emerging issues guide what we do. Besides that we also link up. For instance, tomorrow is a regional media review. I will sit in there and be part and pick issues and that is what operational issues come in to play. From the evidence we get, we develop a focus using periods".

This level of community based agenda determination was not common in organisations in the southern and middle zone of the country, where their priorities appear to be determined by exogenous factors. On the general level, researchers in the south are agenda takers rather than determiners.

"There are no top priority areas in health research here. Whatever the partners bring and its beneficial to the country is carried out" - Respondent

Whatever is available in terms of funding is what we go for ... Based on the nation focus because the government does not give funding, donors give it. However we try to steer it towards the national focus - Organisation doing research respondent

Among research institutions such as the Council for Scientific and Industrial Research, the research agenda is determined in addition to source of funding by where the human resource expertise is readily available. The Noguchi Memorial Institute for Medical Research corroborates the expert bias in agenda setting because individual research fellows seek grants that align with their expertise. The responses may explain the variability of topics found among various research organisations but not the proportion of the research undertaken. The mix of on-going research may be more a function grant applications success discussed later in this document. The institutional mission and products in research are not distinctly aligned and no institution can be said to be following a grand strategy in any particular institution. Broadly interest of northern

partners, individual researchers and opportunism appear to be the clearest determinants of research priority.

On influence and how priorities are determined we explored the importance of constituencies - international partners, government. We did not pitch judgement on whether or not a particular constituency's influence was more important than the other. Instead we examined if by it researchers ranked the constituency important and will react to it on a scale of high, medium or low in determining their research priority as in Figure 8. The responses suggest that researchers were opportunistic in their response to the environment. Figure 9 shows examples of use of research outcomes.
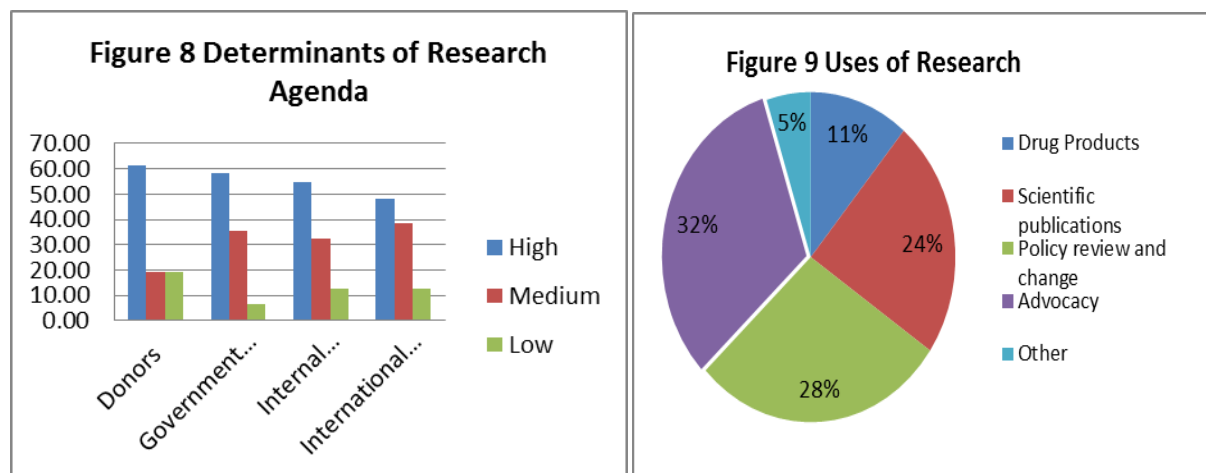
The patterns and determinants of priority areas of research in Ghana are of similar order as in countries of the ECOWAS region and middle income countries. Evidence from a research priority mapping exercise in 14 West African states showed that lack of national funding led to research priorities being set by foreign donors, rather than by the needs of the country (Marais et al., 2011). Sombe et al 2013 noted that 'regarding research priorities, it was not clear how or when these priorities were derived and if they were a reflection of the disease burden or priority health sector problems in the ECOWAS region. It was also not obvious how researchers and their funders knew about their existence, thereby explaining why it did not reflect in the proportions of the research outputs'.

In middle income countries Hofman et al (2009) found that topics of study vary regionally, but primarily include malaria, parasitic diseases, HIV/AIDS, cancer, and cardiovascular disease. About 40% of studies from South Africa are focused on chronic, non-communicable diseases. Their study did not elaborate why these areas were prominent among researchers. COHRED (2000) undertook a major mapping of health research in South Africa as part of the Essential National Health Research (ENHR) project. Unlike in Ghana they observed that research is coordinated and funded through various government departments, both nationally and

provincially. The government also operates under a policy framework supportive of health research, expressing both financial and infrastructural support (COHRED, 2000). Top priorities for research include HIV/AIDS, TB, and HIV vaccine, quality of care, telemedicine, mental health, malaria, occupational health, and violence. This list represents the combined views of research producers, research users, and the community

3.2.3 Current funding

The national aggregated sources of funding as proportions of the whole are mainly core funding from government, research grant and consulting fee. Of the 38 respondents (79%) who answered the question "How much is your annual budget for research" the following was provided.

Figure 10 Range of annual operating budget for research

GHC 0 – GHC 50,000	50.0%		19
GHC 51,000 – GHC 100,000	18.4%		7
GHC 101,000 – GHC 250,000	2.6%		1
GHC 251,000 – GHC 500,000	5.3%		2
GHC 501,000 – GHC 750,000	2.6%		1
More than GHC 751,000	23.7%		9
		Total	38
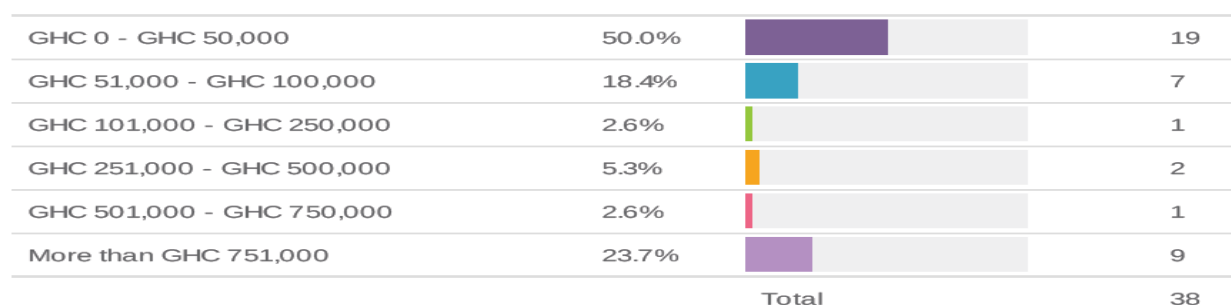
Note: Exchange rate at time of research was 1GHC: GBP 5.45

Various sources of funding were indicated. 'Core funding' defined as government salaries to personnel that are not dependent on specified research activity within the institution.

Figure 11 Main sources of research funding

Core Funding	53.5%		23
Research Grants	48.8%		21
Consulting Fees	39.5%		17
Fees for Training	34.9%		15
Investment Income	11.6%		5
Other	16.3%		7
		Total	43
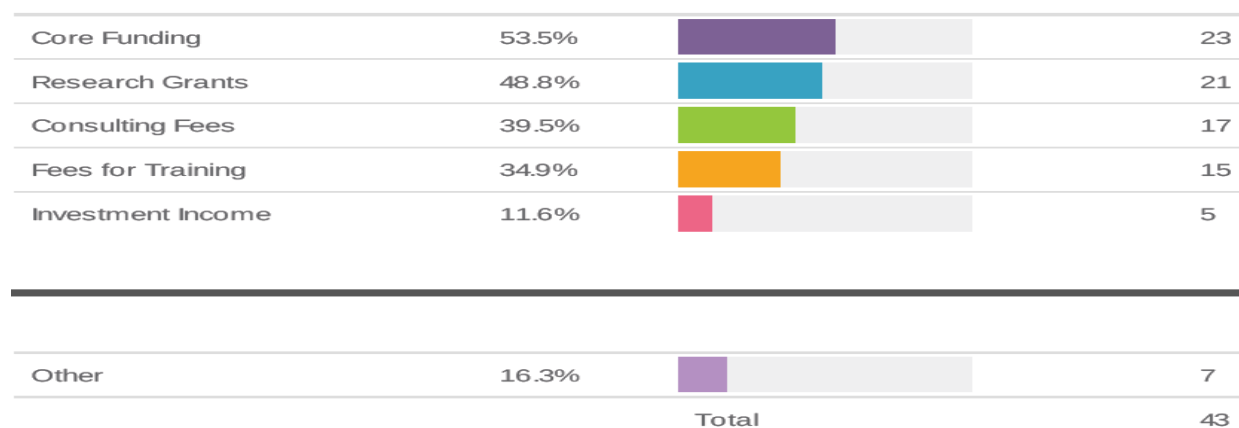
Only public sector institutions indicated receiving funding from government. The funds were generally allocated as in figure 12. Government paid for salaries and other recurrent cost of

academic and research institutions but these were not generally considered in the responses of interviewees. The general response suggests government did not fund research. Staff may be undertaking desk reviews for various purposes including writing research proposals but do not consider these as government contribution to research.

Figure 12 Funded by Government
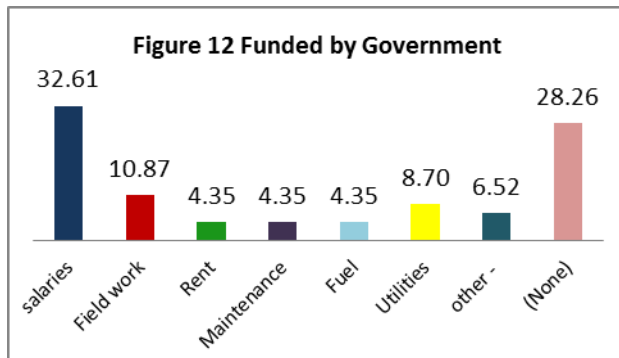
When we interrogated if this should not count a respondent retorted "... what is the use of paying salaries without giving resources for the actual research to happen?". Some benefitting from government salary consider it as essential input. One public sector research institution respondent noted: "if there were no government salary we won't do research. We will rather do consultancies because the grants only have allowance components".

The responses also suggest reluctance on the part of donors to fund core salaries, a situation that many respondents lamented. One respondent expressed concern that government had recently issued a directive to their institution to be weaned of government subvention over the next three years. The directive required that they find markets for their research and research products. That however may be a problem should all other government research institution be required to do the same.

Average success in proposals that lead to a successful grant over the last three years is shown in figure 13. About 38% average less than one successful grant per annum. Whereas 16% were unsuccessful over a three year period to raise any new research funding. The most successful organisations were agencies under the Ghana Health Service und Noguchi Memorial Institute for Medical Research and the School of Public Health of the University of Ghana and the Kumasi Centre for Collaborative Research of Kwame Nkrumah University of Science and Technology. The Centre for Health and Social Services and ISODEC were the most successful private sector institutions in raising resources.

Funds for research from international sources are seen as beginning to dry out. There were concerns expressed linking changing donor priorities and limited resources to recent global economic recessions. Respondent also noted an increasing demand by donors in some instances for evidence of co-funding in their proposals by donors.

"Well I think the credit crunch, there are a lot of proposals sent out but there is no money for donors to support. There is sort of both donor fatigue and credit crunch effect". Public Sector Respondent

"The concerns are that if you take the money we use to get example malaria has gone down drastically. I mean in the past two years there were enough money for research and we get that because there was a person interested in malaria vaccine. That is the Gates Foundation. Now that person [meaning Gates Foundation] has new priorities now we don't get money". Academic Respondent

Some organisations are using innovative pooled approaches to fund some of their activities particularly capacity building and development. The School of Public Health of the University of Ghana for instance requires that all successful grant projects pay 10% into a fund for doctoral programmes. The Centre for Health and Social Services mobilises 15% of all research grants and consultancy service fees including project support costs into a pooled account to finance their self-directed research, human resource and administrative overheads.

There were no concerns raised about the negative effect of international support. Given that government does not provide any funding to the non-government sector most respondents appreciated good faith on the part of development partners and northern collaborators in securing research funding. On how to improve access to funding most respondents advocated for an independent fund managed through a consortium with quota allocations that ensure that institutions of various categories have fair and equal access to funding based on good proposals.

The Ghana scenario has both similarities and differences from those found in middle income African countries where core funding for research came from development partners. In South Africa, COHRED (2000) report identified that health research funding typically comes from the local government, multilateral institutions, or the private sector. Government funding is both used for in-house research as well as channelled to universities and research institutions. In Ghana only salaries are paid but no core funding available for actual research. In similarity to Ghana funding from multilaterals providing resources in South Africa typically goes to

government institutions, while private funds are directed towards the goals of the specific donors. In comparison Mirzoev et al.'s (2013) touched on sources of funding at selected African institutions. Key informants commented on lack of local government funding, acknowledging that most funds come from international sources. Kirigia et al. (2006) noted that in most African

Figure 13 Success in Grant Application

None 16%
1-2 32%
3-5 16%
above 5 36%
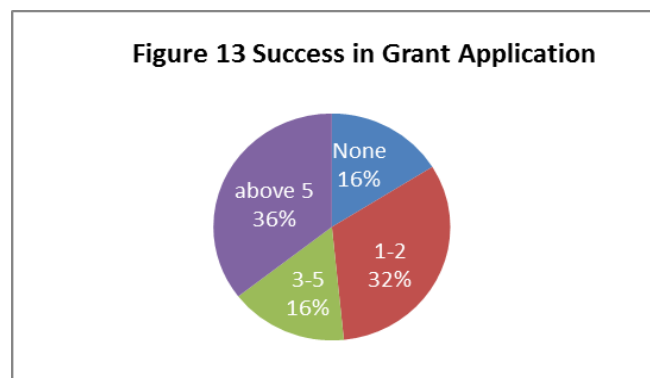
countries multilateral donors were the primary source of funding. Government tax revenues were not indicated as an important source in any of these countries.

COHRED had also coordinated a recently completed project called MASCOT (Multilateral Association for Studying Health Inequalities and Enhancing North-South and South-South Cooperation which provides some very useful information on research funding in Ghana (Akweongo et al 2012). This project addressed health inequalities in maternal and child health. The report noted that in Ghana over 90% of funding comes from external sources, details of which can be found in Tables 1 to 4. Due to this lack of local funding, research direction is driven by the interests of donors rather than the needs of the country. The report provided an overview of the primary research organizations, both public and private. It mentions research needs, citing a national health research agenda, more funding sources, and increased training for inexperienced researchers as key areas for improvement - see Annex B.

In other middle income countries concerns about the impact of international support on research priorities have been expressed (COHRED, 2001), although Swingler et al. (2005) suggests this may not be as harmful as is sometimes perceived. Their study sought to determine if the sources of funding and international collaboration of randomized controlled trials (RCTs) in Africa affect the topics being researched. In all 520 trials were assessed. Of these studies 335reported their funding sources, which were primarily governments and non-African sources. Of these 335, 48% were funded by governments, 19% were funded privately, 26% had a combination of sources, and just 1% was funded by universities. Geographically, 76% of the trials were funded from outside Africa. 6% and 2% were funded from South Africa and other African countries respectively, while 9% used both African and non-African sources. Similarly, studies that did not report their funding sources also tended to have a decreased emphasis on diseases relevant to Africa. They concluded that the funds were complementary and had little or no impact on topics chosen for research.

3.3   Institutional environment

The Ministry of Health has a Directorate for Research, Statistics and Information Management and a national Ethics Committee resides in the Research Development Division of the Ghana Health Service. Only four research institutions were able to produce copies of their corporate strategies on health research even though about 55% said they had either a strategy or policy in place. Approximately 70% of the respondent in this study indicated their organisation had in-house research ethics committees in place. About 60% met more than once in a year. Those in the public sector were more active with one meeting as regularly as once a week. Only about 20% of non-government research institutions met regularly. A sample of the main general functions performed by the research and ethics committees outlined by respondents are:

- Determines the thematic areas of research, supervises and manages on-going research projects and sees to compliance with ethical issues
- Call for research proposals, reviews proposals and provides some funding and monitoring and evaluation of research activities
- Discuss the entire research project, plan activities, assign roles and responsibilities and any other issues relating to the project
- Ensuring quality and ethical research, pursue strategic agenda for funding
- Act as Scientific and Technical Committee (STC) and publications committee and they ensure quality control and ensure that deadline are met

Approximately 20% of those without standing committees indicated that their organisation used project specific technical advisory groups as research and ethics advisors. Forty-six percent of the respondents indicated that their institutions did not have a separate research project management unit in their organisations. The University of Ghana is the only academic institution with a full time Pro-vice Chancellor with a whole unit dedicated for coordinating health research within the university setting. A common trend among 53% of respondents is that individuals or units write and manage their own research activities and grants.

Sombie et al (2013) also looked at the institutional structures developed within ministries of health in coordinating and governing health research. To give adequate emphasis to the role of research within MoH, the proposed that units responsible for research should ideally be at the level of a Directorate. This would facilitate the proper functioning of the research function and influence decision making and policy drafting across all the different Directorates or Ministries to use research. Operating at the level of a Directorate would afford the Research for Health unit an opportunity to have a dedicated budget line for its operations and also make it a little easier to track that country's contributions. This directorate also tends to have cross cutting roles in the activities of other directorates thus fostering more collaboration within the ministry.

However, no information was available in their study to suggest that having a Directorate would necessarily ensure efficient research management in the country. Indeed in Ghana there was no clear advantage for having a Division for health research since it neither generated research nor was it effective in coordinating the national research agenda. While there were three researchers in the unit with one having a doctorate in statistics, they had not undertaken any research activity or held any research focused or coordination meeting.

All institutions had reasonable levels of infrastructure. About 39% operate from up to a two room office accommodation as shown in figure 14. These are mainly organisations doing research that are in the non-government sector. Academic research organisations and Ministry of

Health/Ghana Health Service affiliated research institutions typically operate from multi-purpose facilities with more than five office rooms. This information needs to be carefully interpreted as those in these categories may be constrained of space because of on-going activity and human resource numbers. For non-government research institutions 70% rent their accommodation while 16% are owned by an individual member of staff of the organisation, usually the founder.

MoH/GHS affiliated research institutions and the Noguchi Memorial Institute for Medical Research had developed their own Demographic and Health Surveillance Sites (DHSS) or owns their own laboratories. Laboratories are usually graded by their complexity and proficiency (P) level with level 3 being the highest in general research institutions. Six institutions had a level P1 laboratory, two had a level P2 laboratory and three indicated a level P3 laboratory. The P3 laboratories were found in the Noguchi Memorial Institute for Medical Research of the University of Ghana and the Kumasi Centre for Collaborative Research of the Kwame Nkrumah University of Science and Technology and Kintampo Research Centre tough we could not validate any of these statuses. Noguchi indicated that they had a spectrum of levels P1, P2 and P3 laboratories. These notwithstanding laboratory infrastructure were broadly considered inadequate.

"Current ones are scattered all over the place with hardly any running water. It may be necessary to upgrade it. Public sector the biggest problem is the procurement system. Given the poor state am tempted to say there is no lab infrastructure. We need high level laboratories though the University has put in some money there is still lot of things we can do".

Figure 14 Number of office accommodation

Figure 15 Nature of Accommodation
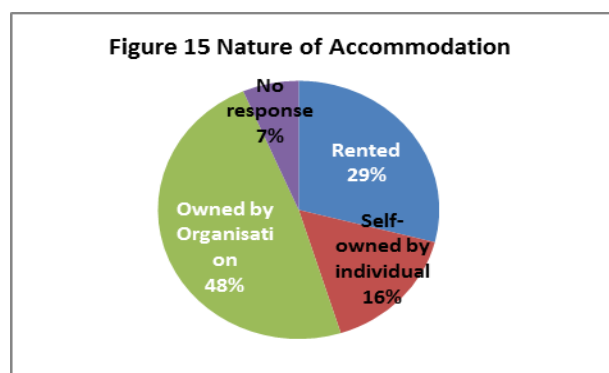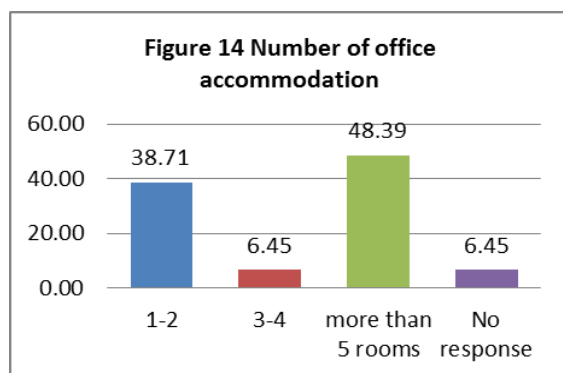
Navrongo Research Centre and the Centre for Scientific Research into Plant Medicine indicated that current laboratory equipment is fit for cross-sectional research but not for longitudinal

studies. They will have liked to purchase high end equipment such as MMRs but the cost is beyond their reach.

All organisations had computers but these were not networked in any organisation. A common practice among the research institutions was that individuals owned 67% of the computers in the organisations. Photocopiers and printers were considered regularly inadequate with 30% indicating non-functioning copiers. The most common infrastructure challenges indicated were poor internet connectivity and bandwidth, constant power outage and lack of back-up generators. Akweongo et al (2012) who in an earlier study noted that Ghana Health Services research centres are the primary assets of the health sector, but their inadequate office facilities, insecure water and electricity, and inadequate housing is a major infrastructural challenge. Similar concerns were expressed by these institutions during this study.

Kirigia and Wambebe (2006) had previously assessed health research infrastructure across 10 sub-Saharan countries, although their study probed more into the policy and organizational infrastructure in place at the national level. The questionnaire asked about structures such as a national health research system, ethical review committee, health research policy, strategic health research plan, national health research institute, health research program, and a budget line for health research in the Ministry of Health. None of these structures were found to be present in more than 6 of the countries studied. Recent findings in the ECOWAS region are encouraging and show the progress that has been made by the countries in this area.

Established infrastructure is a key aspect of an effective health research system. Kebede et al. (2014) assessed the available research facilities at 847 research institutions across the continent. The findings also showed that existing infrastructure is severely lacking, with computer laboratories, network computers, and IT support each unavailable in over half of the institutions. Furthermore, the institutions averaged just three electronic subscriptions to international journals each, and only half of the existing laboratories were accredited nationally. Much of this stems from lack of finances, limited human resources, and an inability to communicate effectively with partners.

3.4   Human resource environment

Generally most research organisations had a fair level of human resource for health research. At the disaggregated level, about 20% of institutions had less than five research and support staff in their organisation. All other institutions had more than five persons with over 48% having more than 15 people on their nominal staff roll. Figure 16 shows the quality of staff available

Figure 16 Quality of human resources available

PhD Doctorate	53.5%		23
MPhil/DPhil	58.1%		25
Masters	76.7%		33
Field Supervisors	76.7%		33
Enumerators	39.5%		17
Data Managers	62.8%		27
Data Entry Clerks	62.8%		27
IT Systems Administrator	62.8%		27
Accountants/Administrators	81.4%		35
Logistics/Purchasing Officer	48.8%		21
Other	14.0%		6
	Total		43

Noguchi Research Institute for Medical Research had the highest number of staff with doctorate degrees that dedicated more than 80% of their time to research. We also found a significant amount of persons with doctorate degrees outside the academic setting even within the private sector.

Figure 17 Mode of Recruitment

Figure 18 Mode of appointment
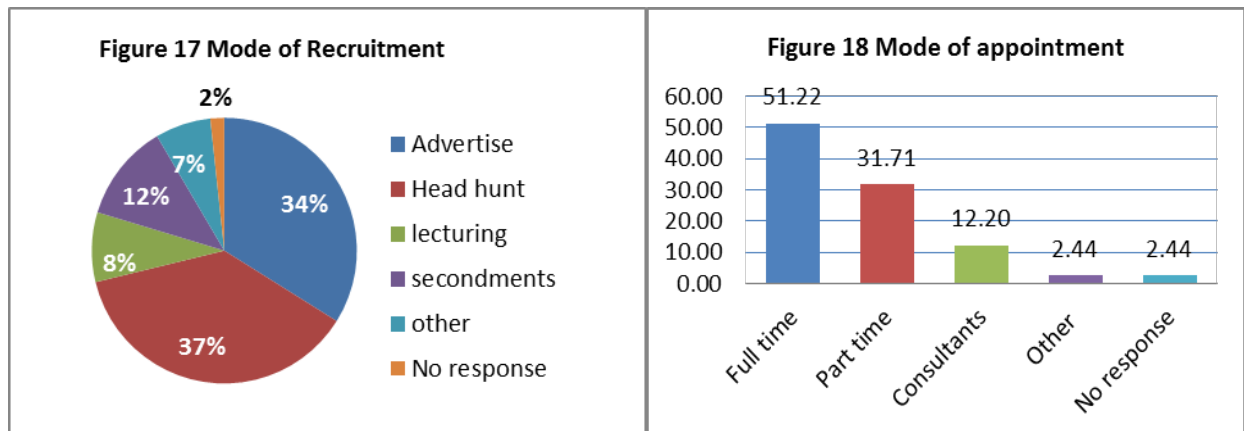
Figure 17 suggest that the most common method of recruitment is head hunting. Respondents indicated that poaching from other organisations was common because "best skills are hard to find" was one person's response. Almost every person (86%) interviewed complained about poaching of their qualified staff. Many raised concerns about difficulty in retaining newly trained staff using institutional resources due to the high variability in project-based remuneration in the system. The category 'lecturing' represented those who were principally lecturers and spend about 20% of their time supporting research. Molecular biology, entomology, bio-mathematical modelling, immunology, health-biased social scientists and economists and parasitological skills were noted as the most difficult skills to find.

The preference among the public sector organisations is full time hire because of the peculiarity of public sector human resource rules. Generally nobody can be a government pay roll part-time. Lesser skills such as enumerators may be engaged on project basis. Private and civil society

organisations in research preferred consultants and part time workers because they could not engage them on long term basis. Reasons provided included high cost of the specialised skills and limited nature of their funding sources. One peculiar challenge expressed by respondents in the northern part of the country was attrition and inadequate incentives to attract qualified personnel to these areas. The northern zone is economically and socially deprived and not conducive for young researchers and those with families. The best qualified staffs are easily picked by southern located research institutions.

We observed from responses general unease in the disparity between fees paid to northern partner experts and local experts when north-south collaboration led to joint research funded project. These ranged between 300% and 1000% for same qualifications and years of experience. The situation left many respondents bewildered and with calls for an internationally accepted standard for remuneration of research globally to be adopted. On how to attain these standard respondents suggested a global expert classification and recommended fee schedule set by the OECD in collaboration with WHO-TDR

Figure 19 Proportion of Women Researchers
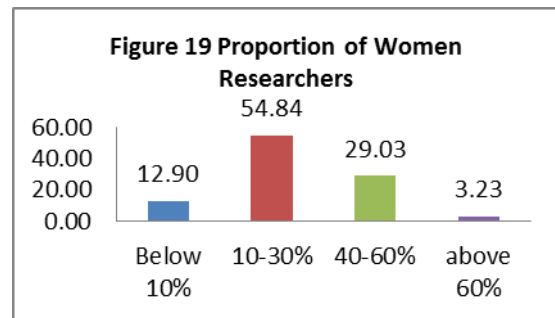
and CDC or an ad-hoc north-south advisory group that meets once every three years to set and review the fee structure. This function may also be decentralised and organised at country level through an independent health research ethics council.

 Women researchers were generally low as in figure 19. Though over 70% of institutions indicated they had in place a research capacity development plan only five of those followed up during in-depth interviews were able to produce a written document. There were indications that many academic and public sector research institutions staff had benefitted from capacity development activities sponsored through their institutions. Only one private sector indicated a capacity building activity linked to a project.

Respondents noted that most capacity building activities are mainly a result of north-south collaborations and is consistent with findings of other middle income countries. The Ghana-Dutch Collaboration for health research and the European Union's seventh framework research programme funding through the COHRED-led MASCOT project) were the most frequently mentioned programs that supported capacity building. There were examples of collaboration between Navrongo Research Centre in the northern region of Ghana and the London School of Hygiene and Tropical Medicine benefiting the centre in developing PhDs. Students from Navrongo are given fee exemptions of up to 90% access to the facilities of the southern partner institutions in reciprocal research. In return the northern partner get access to distance learning

program at the master's level were mentioned with supervision done by Ghanaian accredited experts.

On south-south collaboration, one respondent described it as "tricky". The challenge they see is resource constraint that leads to uncertainty in the collaboration running its full course. Experience as recounted by respondents suggests that successful south-south collaboration always had a northern partner component. Current preference is for north-south collaboration in capacity building though many will be satisfied with a stronger south-south collaboration to achieve the same results. Most respondents in the private sector were however concerned that capacity development opportunity by development partners was biased and benefitted only the public sector. A respondent indicated:

"During the last Ghana-Dutch Collaboration opportunities the private sector was not allowed to source funding for capacity development. The entire project was cooked for government workers only" - Respondent Research Institution

The practice of north-south collaboration supporting capacity building is generally common in countries with middle-income characteristics. Airhihenbuwa et al. described the importance of United States-South African partnership in training thirty postgraduate students in two South-African universities by building their capacities to analyse HIV-related stigma in the national context.

3.5   Dissemination of research findings

Figure 20 shows that channels for dissemination of health research findings is mixed. Workshops and seminars were more widely used. Web sites and broadsheet newspapers also found appeal among researchers. Publications in peer review journals were few. All the researchers interviewed in academic research institutions indicated at least one publication in a peer reviewed journal. Most (87%) preferred to publish in northern or east and South African journals. We keyed in the names of experts provided by the respondents into our search data bases as part of a bibliographic analysis. At the level of numbers these experts appeared to be prolific writers with some individuals particularly in academic and Ministry of Health Affiliated Research Institutions having over 40 publication titles constituting 94% of all publications retrieved. The detail however showed that most Ghanaian researchers appeared as contributors with five or more contributors. The lead authors (74%) were northern research collaborators. Very few authors (6%) appeared as end name authors which usually suggest a senior researcher and publication supervisor.

Other research group experts were less prolific averaging two scientific publications per institution (6% of total retrieved) with the exception of the Centre for Health and Social Services and ISODEC whose experts average almost the same number as academic institution publishers. We reviewed selected grey literature and found that writing styles were varied with inconsistent referencing style. None of the institutions interviewed had an institutional referencing policy including those in academic settings for in-house publications.

On challenges to dissemination some indicated publication fees charged by some journals before publication as a problem. Others noted the absence of editorial support to improve quality of writing. Only four respondents indicated they had published in the Ghana Medical Journal over the last three years. The Ghana Medical Journal was considered as not having the required international recognition. A major contributor to the Ghana Medical Journal interviewed remarked that:

 "Ghanaian researchers were fine scientists, timid publishers and the majority lacked the basic skills for writing scientific publications".

When queried on the limited publications, respondents corroborated the difficulty in writing skills and opportunities for publishing. One respondent suggested that Ghana needs to develop the writing skills of future researchers early on. This should include dedicated writing workshops for existing researchers and specific curriculum on scientific writing included in training doctoral and masters' students. On the whole we found respondents less enthusiastic in discussing the subject of dissemination and publications. About 60% of the respondents indicated that their organisation kept a library of their publications. Unlike in the Kebede et al (2014) study, only four institutions had subscriptions to any journal. The maximum was two subscriptions.

Compared with South African researchers Hofman et al (2009) mapping of biomedical publications found that 40% of MEDLINE-indexed publications came from South African authors, with South African publication rates comparable to other countries with a similar demographic and economic profile. The majority of publications across the region were published in European or North American journals. Nachega et al. (2012) used key informants and a bibliometric analysis to assess epidemiological and public health research in sub-Saharan Africa. Over the past 20 years, a dramatic increase in quantity and quality of publications was

Figure 20: Mode of Communicating Research

- National workshops and seminars — 27.45
- International workshops — 14.71
- Peer Review jounals — 20.59
- Web publications — 16.67
- Print and electronic media — 18.63
- Other (Advocacy and policy briefs — 1.96
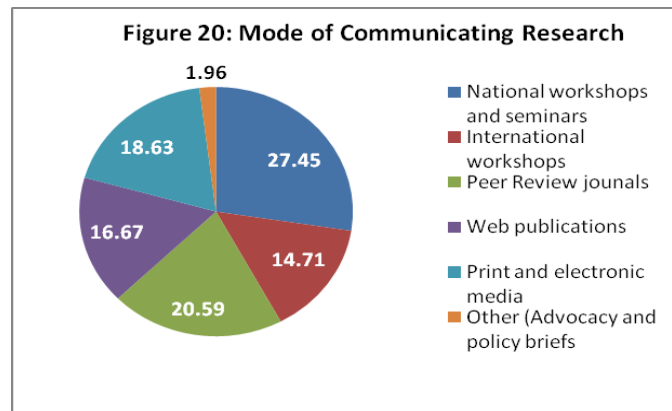
observed. This seems to be associated with an increasing number of HIV patients, as well as increasing North-South collaborations.

In the 520 trials assessed by Swingler et al (2005) authors were non-African or South African institutions. About 60% of the first authors of these studies were from universities, while 32% were government affiliated and 4% were from the private sector. About 45% of these authors had a non-African affiliation, with 23% affiliated with South Africa and 32% affiliated with other African countries. The study concluded that collaboration with non-African researchers is not associated with decreased relevance to Africa. In fact, non-African authorship was more strongly associated with relevance to African than was South African authorship. However, involvement with private industry was associated with a decrease in African importance.

Another publication assessed the state of health economic research in South Africa through a literature review of 185 articles. The authors noted that most articles were published in foreign journals, and those published nationally tended to be of poorer quality and bear little or no relationship with the policy formulation process (Gavaza et al., 2012).

4.   Selected leading Ghanaian institutions in health research

As part of the review process we examined the different research groupings and identified in no particular order sample institutions prolific in health research. We wanted to present at least one institution from the four-quadrant in research groups' platform of the conceptual framework to give a sense of their general profile. We used the following criteria to select the institutions: (i) historical funding volume - above GHC 250,000 annual grant, (ii) human resource strength - at least 3 PhDs, and (iii) scale of current activity - at least three active on-going researches. The inclusion of a particular institution does not imply in any way that these institutions had a better quality of research. No institution in the 'organisations doing research' category met the criteria set. There was also marked variation in the information available for each of the institutions making standardising and comparing difficult. We therefore went for best fit based on our discretion. A separate database is available which provides information on all institutions.

4.1   Ministry of Health/Ghana Health Service affiliated research institutions

4.1.1   Navrongo Health Research Centre

The Navrongo Health Research Centre (NHRC) is health research organization located in the Upper East Region. The NHRC began in 1988 as a field site for an investigation, and has been adopted by the Ministry of Health as a designated research centre since 1992. The NHRC has two research groups: the Social Science and Population Studies Group, and the Biomedical Group.

The objectives of the NHRC are to enhance policy development by generating relevant empirical knowledge, and to facilitate the translation of this knowledge through publication and dissemination, all towards the end goal of improving the health status of both Ghanaians and the world at large. The NHRC seeks to achieve these goals by assessing the impact of interventions, conducting social and demographic research, and facilitating human resource development. As such, the NHRC is committed to improving national capacity for health research through the training and development of internal and external staff. This also involves collaborations and partnerships with other institutions such as the London School of Tropical Medicine, the Noguchi Memorial Institute for Medical Research, and the INDEPTH Network.

Over 50 projects have been completed by the NHRC, most recently being an exploration of moral hazard behaviours under the National Health Insurance Scheme, as well as a study into sexual and reproductive health interventions and their effects on the utilization of reproductive health services by adolescents. There are currently 16 projects underway, including an evaluation of the GMZ2 malaria vaccine, and a study on air quality and the impacts of clean stoves. The NHRC's work is funded by a list of 25 different organizations, including the Gates Foundation,

the Rockefeller Foundation, Pfizer Inc., University of Oxford, and the National Institute for Health.

4.1.2 Dodowa Health Research Centre

The Dodowa Health Research Centre (DHRC) seeks to conduct health research that will influence community health policy. The primary activity of the DHRC is the management of research activities in the Dodowa Health and Demographic Surveillance System (DHDSS). Since an initial census in 2005, the DHDSS has been tracking the population of the Dangme West District, monitoring vital events such as births, deaths, pregnancies, and migration. Information on education, children's vaccinations, and households' socioeconomic status has also been tracked. The Centre also seeks to build multi-disciplinary capacity so as to provide technical support for research within the GHS.

The DHRC is currently undertaking three projects. The first is studying the safety and effectiveness of new malaria treatments, as part of a larger INDEPTH study across 8 HDSS sites in 4 sub-Saharan countries. The second is assessing cost-effectiveness of rapid diagnostic tests for malaria, as well as exploring clinician and patient perspectives towards their use. The last project is exploring problems and solutions to improved sanitation and faecal management in poor urban settings. Some of their recently completed projects include a study of home management of fevers (malaria and pneumonia), as well as research into gender and cultural differences in attitudes towards family planning.

Funding partnerships exist between the DHRC and a number of organizations, including Wellcome Trust, SIDA, the Netherlands government, and the Gates Foundation.

4.1.3 Kintampo Health Research Centre

The Kintampo Health Research Centre (KHRC) is the third field research centre under the Ghana Health Service (along with the NHRC and DHRC). KHRC is composed of both a biomedical unit as well as a population unit. With over 500 employees, with one of the largest district surveillance systems in Africa, the KHRC is regarded as a preferred location for health research initiatives. It seeks to develop health research capacity and conduct research with a pro-poor and gender equity focus, which the goal of influencing policy and practice towards improving the health of Africa's most disadvantaged communities. Priority research areas are:

- Communicable diseases (CDs), particularly malaria, TB and HIV/AIDS
- Sexual and reproductive health
- Maternal, neonatal and child health
- Mental health

- Non-communicable diseases (NCDs) such as hypertension and cancer
- Health systems
- Using the DSS to track progress towards MDGs using indicators such as mortality levels, patterns and trends

The KHRC has a number of both active and completed projects. Active projects include a drug trial comparing the efficacy of two malaria treatments, as well as an assessment of smoke exposure from biomass fuels used in household cooking. Completed projects include an evaluation of a rapid diagnostic test for G6PD deficiencies prior to malaria therapies, and a trial assessing the safety of the RTS malaria vaccine in children. KHRC has a number of funding collaborators, including governments, multilateral institutions, private corporations and charities, and international organizations from across Africa, Europe, and North America.

4.1.4 Centre for Scientific Research into Plant Medicine

CSRPM was established by the Government of Ghana in 1975 and provided clinical services to patient and collation of ethno medical information on medicinal plants and establishment of an arboretum for medicinal plants. Basic science research, however, commenced in 1986 with the establishment of the first research laboratory, which in 1991 was separated into two laboratories; namely, Photochemistry and Pharmacology to reflect the nature of research activities carried out in these laboratories.

The vision of the centre is to make herbal medicine a natural choice for all and to gain the highest recognition for Research and Development of herbal products that meet the exacting needs of both patients and industry, through innovative scientific research and productive partnerships. Both Clinical and product development methodologies were used by the Centre and researches had been conducted into herbal treatment of the following diseases; Hypertension Erectile Dysfunction, Anaemia, Diarrhoea Malaria Fever, Diabetes, Inflammation, Hyperplasia and medicinal plants. Herbal medicines have been developed out of these research activities. It has 180 core staff including 12 research staff.

The major collaborators of the centre include; Kwame Nkrumah University of Science & Technology (KNUST) Kumasi; University of Ghana, Legon; University of Cape Coast, Cape Coast Nogouchi Memorial Institute of Medical Research (NMIMR), Legon; Animal Research Institute (CSIR) World Health Organization (WHO), DANIDA, University of Leipziq, Germany, Royal Danish University of Pharmaceutical Sciences, Copenhagen – Denmark, University of Aberdeen, UK and University of Michigan, USA

4.2 Academic universities and affiliated institutions

4.2.1 Noguchi Memorial Institute for Medical Research

The Noguchi Memorial Institute for Medical Research (NMIMN) is a semi-autonomous institute of the University of Ghana, founded in 1979. Its vision is to be a world class Institute capable of conducting high quality cutting edge research and training in the biomedical sciences. It consists of departments, governed by a faculty board, a director, and a deputy director. The mandate of the institute is to:

- Conduct research of public health importance in Ghana
- Provide training opportunities in medical research for postgraduate students
- Provide laboratory diagnostic and monitoring services for public health programs

Currently, NMIMR is the WHO accredited laboratory for surveillance and diagnosis of poliomyelitis and rotavirus for Africa. In addition the Institute serves as the National Influenza Centre, coordinating Influenza surveillance in the country and also providing data to the WHO influenza monitoring programme. NMIMN's research is divided among the nine different departments: animal experimentation, bacteriology, clinical pathology, electron microscopy, epidemiology, immunology, nutrition, parasitology, and virology. About seventy projects were active as of 2014, primarily on topics related to infectious diseases. The major areas of study included malaria, schistosomiasis, lymphatic filariasis, HIV/AIDS, Rotavirus, influenzas, and mycobacterial infections.

The methodologies used by the institute are clinical trials, biomedical research and product development and their collaborators were Kintampo Health Research Centre and Navrongo Health Research Centre, US Naval Medical Research Centre, US Naval Research Laboratory and Cornell University.

Main sources of funding: Gates Foundation; British Council, Canadian International Development Agency, Centre for Neglected Tropical Diseases, UK, Centre for Disease Control, USA ,DANIDA, Department for International Development, European Foundation Initiative for Neglected Tropical Diseases, European Union, Global Alliance for Improved Nutrition, Global Fund, HolgerPoehlmann-Arzt, International Association of National Public Health Institutes, International Development and Research Centre, Netherlands Organization for Scientific Research – WOTRO Science for Global Development, Afrique One, US National Institute of Health, US Naval Medical Research Unit #3, VestergaardFrandsen, Denmark, Wellcome Trust, and World Health Organization.

The institute has achieved a lot over the past years and selected achievements are follows:

- NMIMR Scientists were the first to diagnose HIV in Ghana in 1982 and the Institute has since served as a reference and confirmatory HIV laboratory in the country;
- NMIMR is the national HIV drug resistance centre that supports the monitoring of anti-retroviral therapy for HIV/AIDS.
- Results of the NMIMR research into malaria contributed to the drafting of the country's first national malaria control policy in the 1990s. The studies provided evidence for the change in drug treatment policy from chloroquine to Artemisinin + Amodiaquine;
- Studies conducted by NMIMR over the years formed the basis for the World Health Organization (WHO) global adoption of the current polio immunisation schedule (with an additional dose at delivery);
- Scientists at the Institute have purified the Buruli ulcer toxin and replicated the disease in animals in order to advance further understanding of the disease and the development of drugs to cure it.
- Results of research conducted at the Institute justified the development of new multiple measles immunizations in children leading to the virtual elimination of measles in Ghana;

4.2.2 Kumasi Centre for Collaborative Research in Tropical Medicine

The Kumasi Centre for Collaborative Research in Tropical Medicine (KCCR) is an independent research platform of the Kwame Nkrumah University for Science and Technology. It has a closer association School of Medicine and with the Bernard-Noche Institute for Tropical Medicine in Hamburg, Germany. KCCR is interdisciplinary, with research spanning biomedical, agricultural, and ecological fields. Through the acquisition of research grants, it is designed to provide a platform for international collaboration between scientists from Ghana and beyond. These scientists conduct basic and applied research in tropical and related diseases. The methodologies used by the Centre include clinical trials, biomedical, health systems and observational research.

KCCR has seven different research groups: medicine in tropics, onchocerciasis lymphatic and filariases, buruli ulcer, virology, haematology, paediatric fevers, and coronavirus zoonosis. Recent achievements include investigations into HIV and hepatitis B virus co-infection, and treatment of patients with filarial infections, type-2 diabetes mellitus and hypertension, cervical abnormalities and cancers, genetics of lymphedema and hydrocele in filariasis. About 67 publications came out of KCCR in 2013.

Their major collaborators are: Bernhard Nocht Institute for Tropical Medicine and their sources of funding were; European Union, Volkswagen Foundation, German Research Council (DFG), Malaria Vaccine Initiative (MVI),German Ministry of Education and Research, and European Mosquito Research Association. Except for faculty who work on selected projects all funding come from the collaborators.

4.2.3   School of Public Health

The University of Ghana, School of Public Health (SPH) is the first of its kind in Ghana, and has the largest population of faculty and students. Founded in 1994, in response to a growing demand for a cadre of Public Health Practitioners who would provide leadership in Public Health reforms at all levels of health service delivery in Ghana. The SPH is a constituent institution of the College of Health Sciences, University of Ghana.

The vision of the school is to promote knowledge and be lead advocates for needed public health reforms in Ghana.

The main methodology used operational research and program evaluations. Their program areas were; Reproductive Health, Health Behaviour, Health Services, Disease Control and Prevention, Occupational and Environmental Health, Biostatistics, Health Insurance, Malaria (Treatment, diagnosis) Maternal and Child Health, Health Informatics, Lymphatic Filariasis (Treatment), Neglected Tropical Diseases, Medicinal Plants, HIV/AIDS (Prevention).

The collaborators of the school are Ministry of Health and Ghana Health Service (all divisions and directorates); Over 35 universities in Africa and across the world; UN Agencies (WHO/UNICEF/UNFPA); Ghana AIDS Commission

Main funders include: United States Agency for International Development (USAID)/ Centre for Disease Control and Prevention (CDC), DAAD (German Academic Exchange Service), European Commission, European Union, International Network for the Availability of Scientific Publications (INASP), Department for International Development (DFID), Medical Research Council UK , Doris Duke Foundation, Comic Relief, Wellcome Trust, INDEPTH Network, National Institute for Health, Fogarty International Centre, Danish Ministry of Foreign Affairs, Ghana AIDS Commission, Centre for AIDS research, Bill and Melinda Gates Foundation, Netherlands Organisation for Scientific Research (NOW/WOTRO), USAID (PEPFAR), IDRC, Japan International Cooperation Agency (JICA)

4.3   Non-public sector health research institutions

4.3.1   Centre for Health and Social Services

The Centre for Health and Social Services (CHeSS) was established in 2009 with a vision of becoming a credible southern-based institution reputed for producing high quality and ethical health research and analysis as input for global health policy. The Centre undertakes policy and operational research, consultancies and training of health professionals. CHeSS was recognized as a key health policy analysis institute in a recent review commissioned by the WHO Alliance for Health Policy and Systems Research.

Over the years CHeSS has successfully conducted twelve (12) researches aimed at influencing the development of policies and notable among them were assessing the role of the private sector in health service delivery in Ghana; the effect of HIV/AIDS programmes on health systems strengthening; factors contributing to performance of district health systems in Ghana; the National Health Insurance Scheme and its impact on the poor; and Community-based Health Planning and Services (CHPS). It has also undertaken consultancies for various national and international agencies.

More recently, the Centre has taken on the role of Secretariat for the Pan African Health Congress and developed the first private University College to train medical and nursing professionals affiliated with the Kwame Nkrumah University of Science and technology and accredited by the National Accreditation Board.

The collaborators of CHeSS are Ministry of Health, Ghana Health Service, District Health Managements, Regional Health Management Teams, Kwame Nkrumah University of Science and Technology, Noguchi Memorial Institute of Medical Research and all the Ministry of Health Affiliated Research Centres. Key funders of CHeSS activities include the Rockefeller Foundation, Star Ghana, UKAID/DFID, World Health Organisation /APOC, The Netherlands Government, Royal Tropical Institute (KIT), World Bank /Results for Development (R4D) and the Japanese Centre

4.3.2 Centre for the Development of People (CEDEP)

Centre for the Development of People (CEDEP) was established in 1983 with a vision of promoting the social, economic and civic rights of society equally for sustainable human development. CEDEP has three key programme areas – Quality education, quality health care and sustainable livelihoods. These programme areas have been achieved through advocacy, good governance and gender development which had empowered the society within its catchment communities.

CEDEP has worked in all ten regions of Ghana from 1996 to 2013. The health assignment covered issues on Reproductive health, HIV/AIDS and PLHIVS, maternal mortality and morbidity, Community–Based Health Planning and Services (CHPS), Malaria, National Health Insurance and Health sector programme of work. Research is however not a core function. If needed research is contracted out. The main focus is on advocacy, training and empowerment. CEDEP has worked with both local and international partners. These include government (Ministry of Education, Ministry of Health, Ministry of Local Government, Ministry of Lands and Forestry, Ministry of Finance, Ministry of Food and Agriculture, National Council on Women and Development, Ghana National Commission on Children and 17 District Assemblies)

Local NGOs (Ghana Education Campaign Coalition, Centre for Democratic Development (CDD) Centre for Sustainable Development Initiatives, Professional-North, Ghanaian National Education Campaign Coalition, Coalition on Domestic Violence, Ghana Microfinance Institution Network, Ghana Network for Participatory Development and Integrated Social Development Centre) International NGOs (UNAIDS;UNICEF;USAID;UNDP;CIDA) and Organizations (DfID, GTZ, Save the Children (UK), Marie Stopes International, Ipas, German Development Service/DED, Habitat for Humanity, JOCV, SNV, US Peace Corps, VSO and World Bank)

4.3.3 Integrated Social Development Centre (ISODEC)

Integrated Social Development Centre (ISODEC) was established 1987. The goal of the NGO is to promote human rights and social justice especially for the marginalized, injustice and the powerless. The main activities covered are peri-urban health and sanitation, basic education, rural water and sanitation, girl child education, family reproductive health, HIV/AIDS, right to anti-retroviral treatment and national budget analysis. ISODEC works in an integrated and multidisciplinary manner in linking the grassroots to the national and global.

The methodologies used by ISODEC were advocacy and research and the organization has worked in all the regions in Ghana .ISODEC has twelve partners including SIMAVI, African Democracy Institute (IDASA) of South Africa, Swedish International Development Agency (SIDA), SEND Foundation, Save the Children -UK , Institute of Democracy in South Africa (IDASA) and Rockefeller Foundation.

4.3.4 The Alliance for Reproductive Health Rights

The Alliance for Reproductive Health Rights is a network of Ghanaian non-government organization formed in 2004 purposely to promote a rights-based approach to sexual reproductive health. The network ensures that the sexual reproductive health (SRH) rights of all people - especially vulnerable groups such as the poor, marginalized and women of reproductive age - are protected and fulfilled irrespective of socioeconomic status, gender or race.

The members are made up of three national governmental organization and 35 local non-governmental organizations coordinated by a secretariat. The network creates a platform through which all members voices can be heard whether limited in capacity, geographical reach or political presence.

Generally only the ARHR secretariat undertakes research on behalf of the entire network. The ARHR works with other Sexual Reproductive Health stakeholders to push for advocacy, capacity-building and research programmes funded by national and international bodies, such as

aid donors and the Government of Ghana. The programmes are implemented and monitored by each tier of the ARHR from policy to grassroots level to ensure real impacts were achieved. Recently ARHR launched the Mama Ye! campaign initiated by Evidence for Action, a multi-year programme which aims to improve maternal and newborn survival in sub-Saharan Africa. Funded by the UK Department for International Development, it focuses on using a strategic combination of evidence, advocacy and accountability to save lives in Ghana, Malawi, Nigeria, Ethiopia, Sierra Leone and Tanzania. MamaYe Ghana is working to ensure the health and safety of mothers and the newborn and engages with local partners to facilitate conversations between providers and recipients of newborn and maternal care.

5.   Conclusions and recommendations

Ghana has had a long history and engagement with health research at the international, national and institutional level. The country drew on various international declarations to shape the development of its research architecture and developed public sector institutions with reasonable human and infrastructure capacity to conduct research. Some Ghanaian institutions continue to enjoy strong partnerships with northern based institutions and some are engaged in strong fundamental and applied research that aligns with Tugwell et al (1995) description. Previous support from the UK, the Dutch and the WHO was found useful with some systems created under these partnerships still surviving. There is no documentary review of the impact of previous support. The research sector in Ghana can nonetheless benefit from restructuring and systemic development for long term impact and sustainability drawing on history and current experiences.

5.1   Research priorities

Determination of priorities for research is generally weak at the national and institutional level. The World Health Organisation defines a process for prioritization of health research within context (WHO, 2009) as a scheme to build consensus on a set of research issues that require urgent attention. Romero and Quental (2014) proposed that the 'principal objective for establishing research priorities for health at the domestic or international level is to align investments with the population's health needs in an efficient way to improve health and quality of life' (p. 3). This is sound reasoning. At the minimum a national platform may be required to balance the several factors with the population's needs.

Based on these and experience from the Ghana-Dutch Research Collaboration the research agenda setting needs to be more engaging of multi-stakeholders, phased in terms of generating knowledge linked to the sector development programme, new technology and informing technology adoption in the short, medium and long term.

Recommendation 1: A national health research priorities and strategic plan should be developed using a multi-stakeholder consultative approach under the auspices of the Ministry of Health.

5.2   Funding

Government currently funds the public sector research institutions and those found in public sector academic settings. These are directed at salaries and some utility cost and provision of infrastructure. The private and non-government sector has less support. The research agenda is largely dependent on international funding, opportunism and success with grant applications. At the moment grant application success rate in organisations undertaking research and non-

government sector research institutions is lower compared to the public sector institutions. There is nothing wrong with northern funding of research as these are viewed very positively and complementary to local efforts. What is important is for the Government of Ghana to find ways of earmarking resources for research and reward high quality as done in other countries such as South Africa. Funding priorities should also target new technology and knowledge generation for advancing scientific knowledge.

Recommendation 2: There is a general capacity issue identified for writing of successful research proposals. This needs to be addressed at a fundamental level through workshop type programmes nationally and internationally. The type of training should fit the Stokers (1997) model quadrant for research so a balanced portfolio is developed nationally and based on national research priority areas

Recommendation 3: The Ghana-Dutch Research Collaboration has shown that a centrally created health research fund holds great potential to be tailored towards funding national priorities. This option should be explored to develop north-south pooled funding for research. The fund governance systems should be structured to address the weaknesses that existed under the HPR. Government should be encouraged to contribute to the fund (target 2% Health Expenditure as required by WHO) and access fairly opened with possible quota system for the public and non-government sector.

5.3   Governance

The Ministry of Health's research division is weak and needs strengthening if it is to realistically assume a stewardship function. The emphasis however should be on liaison rather than coordination which should properly sit in an independent National Health Research and Ethics Council. The Ghana Health Service has extended its expertise in this area to provide services for others requiring ethical review. This effort should be applauded but is inadequate in addressing the governance gap that currently exists. The call for an independent multi-stakeholder committee holds great merit. It will increase transparency, bring greater ownership and standardisation and improve access to information.

At the institutional level University of Ghana identified the need and appointed a Pro-Vice Chancellor for Research and Development. It is not clear how this has benefitted the university. This should be evaluated and if positive encouraged in larger universities with Heads of Research appointed in smaller institutions to direct institutional research priorities and ethics. This can significantly boast the research focus of these institutions.

Recommendation 4: The Ministry of Health should appoint an experienced health research professional to head the Research Division and assign it with a health policy and liaison function.

A Common Management Arrangement for Health Research may be developed to provide the framework for the health policy and liaison function.

Recommendation 5: An independent National Health Research and Ethics Council backed by legislature needs to be constituted with a full time Secretariat; with clear and transparent criteria for electing its membership. Its mandate should include standards settings, review and approval of research proposals, management of the research fund, health research repository, publishing a national registry of credible research institutions and organisations doing research. The membership may include representatives of the various research groups with emphasis on adequate non-government and private sector representation.

Recommendation 6: A Society for Health Research Professionals in Ghana (SHREP) should be facilitated and formed to serve as a coordinating body of professionals and platform for dialogue among professionals. It will also serve to provide coordinated input into governance, policy and legislative issues from the perspective of the practitioner

5.4   Human resource and capacity building

Infrastructure does not appear to be a challenge for Ghanaian research institutions. However laboratory based institutions will require some additional support to bring their laboratories to speed. There are also opportunities to link equipment in health provision facilities with research institutions. For instance, the MRI and CT- scan in Korle Bu Teaching Hospital is research grade equipment but currently being used for diagnostics only. We found that none of the non-government health research institutions including academic ones had a laboratory or DHS site or have taken advantage of health facilities laboratories for research.

Opportunities exist in exploring north-south capacity building and mentoring of young researchers. This should lead to skills and technological transfer and enhance acquisition of cutting edge competency in research Ghanaian institutions. The support system needs to be balanced to provide equal opportunities with a deliberate emphasis on private sector capacity building.

Different institutions pay varying fees and salaries for same level expertise and researchers follow the money. When we submitted this evidence to a stakeholder meeting not all agreed that the disparity in research professional fee schedules is a problem. Some argued that the market should determine the price. At the minimum however ethical standards need to be upheld in terms of recruitments, presentation of names in research proposals with proof of employment status and consent from parent organisations for collaboration.

Recommendation 7: To improve diversity a conscious effort should be made to identify health specialised universities and build their laboratory capacities to engage in health research. An appropriate framework should be developed to support private-public-partnerships in research infrastructure sharing with appropriate incentives by the National Health Research and Ethics Council.

Recommendation 8: Continued capacity building for research staff is important particularly for the identified deprived speciality areas for the proper functioning of organisations. Some of the required competencies can be obtained through mentoring and health research management training. This could be done through actively twinning of universities and organisations through public-private, north-south and south-south collaboration. A conscious effort should be made to make information on training opportunities available to the non-government and non-academic sector.

Recommendation 9: Given the high disparity in fee schedules and the possible ethical and moral issues arising from poaching staff it may be necessary for the recommended independent Health Research and Ethics Council to review and set basic rules and standards in human resources for health research consultancy fees, staff recruitment and collaborative research.

5.5   Dissemination of research

Publications and dissemination of research findings was identified as one of the challenges in the entire research spectrum. Compared to South Africa, Ghana is behind in terms of capacity and opportunities to publish. To effectively address the two-community debate in Ghana, a targeted effort has to be made to retrain existing researchers and put in place a standard requirement for all research based degrees to have a compulsory course in scientific writing and research dissemination. The Ghana Medical Journal will need technical support to restore its credibility among researchers. Irrespective, researchers should be encouraged to take advantage of open source journal publishing as an entry point into international publishing.

Recommendation 10: Support the development of a structured Continuing Professional Development programme for health researchers focused on publications and dissemination e.g. peer review journals, blogging, public presentations, writing for print and electronic media and policy brief writing. This may be done through south-south collaboration

Recommendation 11: Provide technical support to the Ghana Medical Journal to revamp the journal and increase its visibility and credibility nationally and internationally with a possibility of developing an additional national journal targeted at public health and systems.

Recommendation 12: Engage stakeholders to develop a national annual forum for Health Researchers-Policy Makers-Dialogue as a platform to promote interaction between researchers and policy makers. This will ensure that policy is based on evidence with contextual information from Ghana-based researcher

Recommendation 13: Publish and make available to policy makers and legislators list of renowned health researchers and their expertise. This will give researchers some level of local prominence and ensure that their expertise is drawn upon by decision makers as and when needed.

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Annex A: The research financed in the first two cycles

NO.	TITLE	PI	INSTITUTION/DEPT.
2001/GD/05	Communication Channels and Strategies and the Potential Role of Community Members in HIV/AIDS Awareness Creation and Behavioural Change in the Dangme West District, Ghana	Ms Patricia Anarfi/ Dr Irene Agyepong	Dangme West District Health Administration/Research Centre Greater Accra Region
2001/GD/07	Resistance to Anti-Microbial Drugs in Ghana	Dr Mercy Newman	Dept. of Microbiology, University of Ghana Medical School Greater Accra Region
2001/GD/08	Community Satisfaction, Equity in Coverage and Implications for Sustainability of the Dangme West Health Insurance Scheme	Dr Irene Agyepong/Edward Bruce	Dangme West District Health Administration/Research Centre
2001/GD/11	Evaluation of Mutual Health Organizations in Southern Ghana	Mr Joshua Baku	ERNWACA
2001/GD/14	Evaluation of Mutual Health Organizations in Northern Ghana	Mr Robert Kuganab Lem	Dept. of Allied Health Science, School of Medicine and Health Science, University for Development Studies

No.	TITLE	PI	INSTITUTION/DEPT.
2002/GD/14	Financing Health through Community Health Insurance. What the Communities think?	Dr Jack Galley	District Health Administration, Juabeso-Bia
2002/GD/16	Inequalities in the District Public Health Service Performance. What underlying factors?	Dr Godwin Afenyadu	Regional Health Administration, Western Region
2002/GD/17	Health Care Financing the perception of and demand for Mutual Health Insurance in the Kassena-Nankana District of Northern Ghana	Mr James Akazili	Navrongo Health Research Centre Navrongo- UER
2002/GD/21	Communication and HIV/AIDS prevention messages through unorthodox community-based means	Mr Joshua Baku	Leklebi Union (NGO) Leklebi- Hohoe District
2002/GD/30	Assessing Service Delivery factors contributing to preventable maternal mortality in the Upper West Region	Richard Basadi	Regional Health Directorate Wa Upper West Region
2002/GD/32	The Utilization and effects of official directives, manuals and guidelines on the quality of staff performance in the health sector	Dr Mercy Bannerman	Allies in Health and Development Accra
2002/GD/37	Assessing the Quality of Immunization in the Techiman District	Dr George Bonsu	District Health Directorate Techiman-Brong Ahafo Region
2002/GD/40	How can we better match the training, support and incentive systems for leaders of sub district health teams to the performance requirement of the Ghana Health Service at the sub district level	Dr Irene Agyepong	Dangme West Health Administration Dodowa
2002/GD/41	Improving the Quality of Health Care Delivery in Komenda-Edina-Equafo-Abrem District of Ghana	Prof Kobina Turkson	Dept of Agriculture University of Cape Coast
2002/GD/43	Assessing the Impact of CHPS Initiative in the Nkwanta District	Dr Koku Awonnoor	Nkwanta District Health Administration Nkwanta- V/R
2002/GD/48	The Search for Improvement in the Quality of Health Care: The Contribution of Public Health Postgraduate Students' Research Recommendations to Districts	Dr R.. O. Asante	School of Public Health University of Ghana, Legon
2002/GD/50	High Treatment defaulter Rate among TB Patients in Western Region: What are the Contributing Factors	Dr Atsu Dodor	Effia Nkwanta Hospital Sekondi-Takoradi Western Region
2002/GD/53	Detection, Assessment and Prevention of Adverse Events following Immunization with a new Pentavalent Vaccine in Ghana's EPI	Dr Alex Dodoo	Centre for Tropical Clinical Pharmacology and Therapeutics, University of Ghana Medical School Korle-Bu
2001/GD/03	The Role of Stigma in the Spread of HIV/AIDS in the Dangme West District	Ms Patricia Anafi	Dangme West Health Research Centre Dodowa

Annex B: Research funding programmes relevant to MCH issues and inequalities in Ghana

Program	Funder	Year	Description	Budget
Newborn Home Intervention Study	Save the Children/Saving Newborn Lives, WHO, and DFID	2009	Develop a community-based approach to improve neonatal survival	NA
Newborn Vitamin A Supplementation Trial	WHO	2009	Determine if vitamin A supplementation given to neonates in first two days post-birth reduces infant mortality	NA
The Oxytocin Initiative	PATH through the Bill and Melinda Gates Foundation	2010	Determine if administration of oxytocin during the third stage of labour reduces the risk of postpartum hemorrhage	NA
Malaria 055	MVI	2009-2013	Phase III clinical trials of the RTS,S malaria vaccine in African children	€3.7 B
Typhoid Fever Surveillance in Africa Project	WHO, US CDC, Institut Pasteur, BNITM	2010-2012	Typhoid fever surveillance in sub-Saharan Africa	€165,000
AngloGold		2011	Assessment of malaria parasite rates in children of the Obuasi municipality in preparation for an indoor residual spray intervention	€21,000
Child Development Study		2010-2012	Determine the impact of specific diseases as measures of child development	€634,000
Malaria in Pregnancy Project		Active	Determine the optimum method of managing malaria in pregnant women	$767,052
Mobile Technology for Health	Grameen Foundation	Active	Develop mobile-phone-based health information technology	$294,073

Table 8: Research funding relevant to the sociological field and determinants of health

Program	Funder	Year	Description	Budget
Delivery and Postnatal Care	SNL	2010	Determine what mothers know and recall about post-natal care in order to formulate a set of questions for surveys	$32,422
Rapid Mortality Monitoring in Real Time		Active	Estimate timeliness of vital events reporting at the community level so as to make vital registration available to rural populations	$650,000

Table 9: Research funding programmes relevant to health policy development

Program	Funder	Year	Description	Budget
Quality of prenatal and maternal care		2009-2013	Improve quality of maternal and neonatal care by addressing the know-do gap	€493,492
Ghana Essential Health Intervention Project		Active	Strengthen the health system by through activities that improve the prevention, treatment, and management of diseases towards improving maternal and child health	$284,481

Home Management of Malaria and Pneumonia		2006-2010	A cluster randomized controlled trial to develop an intervention for home and community management of pneumonia in children under 5	$800,000
African Programme for Advanced Research Epidemiology Training		2011-2013	Stimulate research activities by assigning several qualified fellows to conduct programmes designed to build sustainable research capacities in Africa	€74,000

Table 10: Research funding programmes relevant to the biomedical field

Program	Funder	Year	Description	Budget
Risk of obesity and diabetes among migrants	EU	2012-2014	Assess the interplay between environment, behaviour, and genetic features in type 2 diabetes and obesity	€280,300
Tuberculosis 5	German Ministry of Education and Research	2011-2012	Understand potential genetic factors involved in either protection or susceptibility to TB	€35,000
Tuberculosis 6	Deutsche Lepra-und Tuberkulosehilfe	2010-2014	Understand the role of candidate microRNAs in T-cell response during acute TB and latent TB infection	€200,000
BAT	German Research Council	2009-2013	Understand zoonotic transmission of coronaviruses from bat to human	€109,000
African Network of Drugs and Diagnostics Innovation	WHO/TDR	2010-2014	Training of researchers in biomedical research	€23,700

Source: Akweongo et al 2012

Annex C: Questionnaire

1. Institutional identification

Name of institution		
Type of institution (Circle which applies)		
Name of person interviewed		
Contact details	Phone	
	E-mail	
	Website	
Name of Head of Institution		
May the DFID contact your in future?		

100 Scientific policies, priorities, output and linkages to policy

101 Is there a research policy and or strategy document that guides health research development in your institution? (obtain a copy if possible) Yes [.]   No [.]

102 Do you have a corporate research strategy document? (obtain copy if yes) Yes [.]   No [.]

103 Have you got a copy of the national health research policy or strategic framework from Ministry of Health or Ghana Health Service: (as to see copy if yes)   Yes [.]   No [.]

104 What types of research are you mainly involved with? (tick)

	Clinical trials		Microbiology Laboratory based
	Operations Research		Health systems research
	Other: pleases list		

105 What were your areas of research over the last 2-5 years? List subject area or disease conditions

106 Why have you focused on these areas?

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107 What are your two top-most health research priorities?

a.

b.

108 What influenced your choice of research priorities?

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109 How would you rank the influence of the following (tick):

a. Donors: High | . | Medium | . | Low | . |

b. Government Policies   High | . | Medium | . | Low | . |

c. Internal Institutional Policies   High | . | Medium | . | Low | . |

d. International Health Agenda   High | . | Medium | . | Low | . |

110 What are the primary uses of your research output (tick as many as applicable)

a. Drug products | . | b.   Scientific publications | . |

c. Policy review and change | . | d. Advocacy | . |

e. Other ....

200 Communication of research

201 How have you communicated your output? (tick as many as applicable)

a. National workshops and seminars | . | b. International workshops | . |

c. Peer review journals | . | d.   Web publications | . |

e. Print and electronic traditional media | . | f. Other ....

202 What is your preferred medium for dissemination/communication? (Kindly

explain)..

....

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203 Do you have a compilation of bibliography of reports and publications of work by your organisation
or staff? (if yes, get a copy) Yes   No | . | | . |

300 Capacity development and training

301 How many people approximately are researchers in your organisation?

Less than 5 [.]   6 – 10 [.]   11 – 15 [.]   above 15 [.]

302 How many hold

Qualification	Number
PhD	
Masters	
1st degree	
Diploma	

303 What proportion of your researchers are women?

Below 10% [.]   10 [.] 0%   4 [.] 0%   abov [.] %

304 Do you have a research capacity development policy or plan for staff development (if yes see)

Yes [.]   No [.]

305 Describe any South-South and South-North collaborations and network you are involved in developing your capacity and how beneficial this has been

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400 Research Governance, Management and Administration capacity

401 Do you have an in-house research council or committee?

402 If yes kindly describe their functions

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403 How many times has the Committee met in the past one year?

404 Do you have a separate research projects management unit?

405 If yes kindly describe its functions

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406 How do you recruit your staff? (tick as many as applicable)

| . | a. Advertise | . | b. head hunt | . | c. lecturing faculty – government
| . | b. secondments | | | . | e. other ……………………………………………

407 What is the most common method of research staff appointment? (tick as many as needed)
| . | Full time | . | part-time | . | consultants | . | other…………………………..

408 Kindly explain why you use the current methods of staff recruitment and appointment?

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409 Could explain what are the common challenges you might have in recruiting and research staff?

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410 Kindly name four persons on your research team that you consider as experts and their areas of expertise (request for staff directory if that is easily available)

Name	Highest degree if known	Area of expertise	Contact if available

411 Are there a capacity area you think are essential to be developed for researchers which are clearly missing or you will have liked emphasised more in current capacity development plans and opportunities?

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500 Research infrastructure

501 What is the nature of your office accommodation?

[.] 1-2 rooms   [.] 3-4 rooms'   [.] more than 5 rooms

502 Is this: [.] a. Rented [.] b. Self-owned by individual [.] c. owned by organisation

503 Do you own an in-house laboratory? A. Yes [.]   b. No [.]

504 If yes what is the P level classification of your laboratory? [.] P 1 [.] P2 [.] P3

505 How many functioning computers approximately do you have? < 5 [.] 5 – 10 [.]   [.]

506 Do you have a functioning Disease Surveillance Site?

507 In your opinion what are the main challenges you have with your current infrastructure for research?
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600 Financing and financial sustainability

601 Do you receive any core funding from government?

602 If yes what does it cover? (tick as many as applicable)

	Salaries		Field work		Rent
	Maintenance		Fuel		Utilities
	Other				

603 How successful has your institution been in grant applications over the past 2 years?

| . | None | . | 1-2 grants | . | 3-5 grants | . | above 5 |

604 What are some of the main challenges you have in attracting funding for research?

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605 Are you concerned that you may not get adequate funding for research over the next 5 years?
Kindly explain your response

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606 How may research funding by structured to improve on the current situation on access by southern
organisations?

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607 Do you have any other information you may wish to offer in terms of research development in
Ghana?

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This is the end of the interview. Thank you for your time.

In-depth interview guide: Use as guide only for probe

Aim of the interview: The aim of this interview which is with higher management within institutions is to understand the production, advocacy and use of health research for policy and programs in Ghana. It will examine the current research capacity of institutions as well as future projections on capacity and research development as well as funding arrangement and sustainability issues. It takes into account other information that have been obtained from the profile/data base of institutions, literature review of existing mapping reports and the preliminary analysis of the on line survey conducted earlier. Start by obtaining consent to conduct interview by reading the consent form and as far as possible obtaining approval to proceed by signature or thumb print. As much as possible record interviews and transcribe verbatim in addition to written notes.

2. Institutional identification

Name of institution	
Type of institution (Circle which applies)	Description of institution type e.g. MOH/GHS Research Institution, university, research centre, think tank, private institution, network, funding agency, NGO
Institution contact details	Phone, fax, email, website
Director of Institution or contact person,	Provide name, email and telephone
Experience of Director	Duration in current post, previous background

3. Scientific policies, priorities, output and linkages to policy

- Is there a research policy and or strategy document that guides health research development in your institutions? (obtain a copy if possible)
- What are your areas of research over the last 2-5 years?
- Why have you focused on these areas?
- What has influenced your choice of research priorities?
- How would you rank the influence of the following:
  - o Donors (High, Medium, Low)
  - o Government Policies (High, Medium, Low)
  - o Internal Institutional Policies (High, Medium, Low)
  - o International Health Agenda (High, Medium, Low)

- - - - - o Can you explain the process of setting research priorities within your institution? Do they come out of policy and programs of the health sector and do policy makers consider them relevant?
- How have you communicated your output?
  - o If you used seminars and workshops, what kind of persons did you invite? Did they include policy makers of the MOH and GHS?
- It is said that policy makers do not use research information for decision making. What are your views on this?
- What is your preference for publications (international, local media, etc)?
- How many high quality publications have been accepted by peer-reviewed journals? (Get list 5 top publications from last 5 years and presentations at international conferences
- How do you communicate your research findings to the general population?

4. Skills developmentand research training capacity

- What is your total staff strength?
- Number dedicated to research
- How many hold

Qualification	Number
PhD	
Masters	
1st degree	
Diploma	

- Is there a balance between males and female, senior and young staff? Explain.
- How many short courses on research have been delivered past one year?

- What topics did you cover?
  - o grant management,
  - o proposal writing,
  - o qualitative methods research methods
  - o quantitative research methods
  - o Communicating research findings

- Describe any South-South and South-North collaborations and network you are involved in

5. **Research Governance, Management and Administration capacity**

- Is there a Board or Council for research and if so describe its main functions. How active is it in terms of how many times it has met in past one year.

• Do you have an institutional review committee? How long has it been established and how often does it meet? If no, how are you're your research projects reviewed for ethical clearance? Describe any challenges with ethical clearance and how they are overcome.

- Do you have a separate research projects management unit? Describe its functions. How should research project be supported and managed?

- Description of management structure and recording of structure, details of strategic and operational planning, maintenance of research database

- Kindly provide details of nature of management system, flexibility of system, ability to process external, international funding sources to include auditing system and audits done. Is an audit report available and how recent is it?

- Kindly describe HR systems and policies e.g. for recruitment and retention

- Describe details of procurement system allowing institution to enter into contracts and grants with funding organizations

- Kindly describe details of administrative procedures in place to help running of efficient office

6. **Research infrastructure**

- Kindly describe availability and use of ICT in this institution. What are the constraints and how are these addressed.

- Kindly describe adequacy of field sites and laboratory if any for research.

- Kindly describe physical infrastructure, availability of space, access to meeting space, working space, conference room and library facilities. What are the limitations and how are these being addressed

- Make an assessment of availability of computers, standard of computers and access for research staff and students

7. **Financing and financial sustainability**

- Do you receive any core funding from government and what does it cover? (Ask about salaries, field work, infrastructure and utilities etc)

- How successful has your institution been in grant applications over the past 3-5 years? (Obtain grant name and amount over past 3-5 years)
- How do you think health research funding should be structured and managed to ensure financial sustainabilityin our research environment?

This is the end of the interview. Thank you.

Annex D   Terms of Reference for Health Research Mapping

Background

1. Ghana has made major strides in reducing poverty supported by relatively strong political and economic institutions. Income poverty has halved over the last two decades and Ghana is now categorised as a Middle Income Country (MIC).

2. Given these conditions DFID is increasingly looking at how Ghana can transition from international aid. The role of research in supporting these processes especially in relation to informing policy direction will be important and therefore there will be a growing need for a sustainable research sector within Ghana with strong research capability.

3. One way of understanding the research landscape in particular sectors in a country is to undertake research mapping exercises. This is an approach DFID has been using in a number of its focus countries in South Asia.

4. Social Science in India: A Mapping Report[3] (2011) reviews the institutional landscape of social science research in India. The report covers the research agendas of research groups or institutions and main sources and distribution of funds.

5. The Mapping of Research Capacity in Afghanistan report[4] (2011) was commissioned to map research capacity and identify gaps in research and analysis in Afghanistan that are valuable to Afghan and international development partners.

6. The Mapping of Public Policy Relevant Research in Pakistan[5] (2013) focused on describing and analysing the policy relevant research landscape in Pakistan. This project also included an analysis of the political economy of research in Pakistan5.

7. Building on these projects in South Asia, recent research mapping exercises have been commissioned by DFID in South Africa and Kenya and now there is an opportunity to undertake one for Ghana, with a specific focus on the <u>health</u> sector.

8. DFID Ghana and the Ministry of Health believe that there are relatively strong research structures in place within the health research sector but through a research mapping

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[3] http://r4d.dfid.gov.uk/Output/190220/Default.aspx

[4] http://r4d.dfid.gov.uk/Output/190699/Default.aspx

[5] http://r4d.dfid.gov.uk/Output/193916/Default.aspx

exercise there is an opportunity to look in depth at this sector to identify the key institutions that carry out health research, what the major research priorities are and what research is currently being conducted in the country. This exercise will also provide an insight into the current sustainability of research institutions and provide some comparison of the state of Ghanaian health research with similar MICs.

9. Previous studies have been undertaken on the health research sector in Ghana as well as more general mapping of research institutions and DFID is keen to build on and update this existing work as part of this research project[6].

Objective

10. DFID Ghana and DFID's Research and Evidence Division would like to commission a research mapping of health research in Ghana.
   - Research mapping is not widely done, so we encourage bidders to look at examples from the Research Councils UK (www.rcuk.ac.uk/international/Offices/OfficeinIndia/landscape/Pages/Arts.aspx) and also previous research mapping exercises delivered for DFID (as referenced in the Background section).

Recipient

11. The direct recipients of this work will be DFID Ghana, Government of Ghana and DFID's Research and Evidence Division. The outputs will be shared across DFID and made available on DFID's Research for Development web portal.

Scope

12. Health Research Mapping
   i.   A review and synthesis of any existing research mapping exercises and analysis undertaken in Ghana identifying any changes made as a result of this previous work and where possible any identifiable effects of these changes.
   ii. Identify any major enablers and barriers to doing health research in Ghana including social, political, cultural and economic factors that affect where, why and how research is carried out?
   iii. Identify how research questions are identified and by whom?
   iv. Map the key institutions or groups undertaking health research in Ghana. The main areas of focus and strategic priorities (including geographic focus), if any, of these research groups or institutions. This needs to include a mapping of centres of research across the country and assessment of the links between centres and other research institutions.

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[6] http://www.cohred.org/publications/library-and-archive/evolution_of_health__1_137/

v. Identify and assess the potential sustainability of existing research centres and networks and what partnerships exist with external sources e.g. donors, NGOs, research councils.

vi. The main sources and distribution of funds for health research including external sources such as World Bank, other bilateral donors, and NGOs or foundations.

vii. Identify the different types of research being produced – such as clinical trials, secondary data analysis, operational research etc..

viii. Identify the individual sectors within health that research is being conducted in such as malaria, health systems, maternal health etc…

ix. Provide a comparison of the Ghana health research sector with similar Middle Income Countries' health research sectors.

x. Identify the key forums through which Ghanaian health research is communicated and where researchers and users of research are brought together.

xi. Identify specific areas in health research in which there might be particular strengths within Ghana.

13. Please note that we do not want to make a quality assessment of health research in Ghana given the difficulties in agreeing an accepted set of metrics for assessing quality. This has been something that has been tested in previous mapping projects and has not been feasible.

Methodology

14. Proposals should include details of the methodology, including how the institutions or research groups will be identified, how the data will be collected and recorded and an approach to how comparisons with similar Middle Income Countries health research sectors can be made.

15. The project will involve both desk based reviews and key informant interviews drawing from a wide and balanced range of sources and evidence. Tenderers should propose how interviewees are selected and the content of the interview.

16. As part of the process for scoping the study, existing evidence which could support the planning and undertaking of the mapping exercise will be identified during the inception phase and further inform the project design. DFID will also identify any relevant projects to support this process.

17. Research mapping is currently being funded by DFID in South Africa and Kenya. DFID will facilitate contact with these two mapping projects and the supplier of this project, so that lessons can be shared.

18. For each institution or research group identified as part of the mapping exercise, the following should be provided:

i. location and group name;

ii. a short paragraph of background information on the groups' overarching research focus [and activity];

iii. information on why they have been selected;

iv. a web link;

v. contact details (postal and central email addresses);

vi. whether the institution/group agrees to be contacted by DFID to notify of any forthcoming research opportunities .

19. More than one group within the same institution may be referred to, as well as more specialised whole academic institutions or units.

Reporting and Outputs

20. The supplier will be responsible for the delivery of the project and its outputs, and will be required to deliver outputs against pre-agreed milestones. The proposal should outline a clear workplan to produce the following outputs:

 i. Short inception report setting out the approach and any early discussions with key stakeholders. This should be received four weeks after project implementation.

 ii. Short monthly updates on progress in the form of a report setting out activities and progress made so far and highlighting any key challenges or risks that might arise.

 iii. A final report with a narrative discussion of the health research landscape in Ghana, covering the issues set out in section 12 and highlighting areas of strength and where particular health research topics are more dominant than others. The report should include suggestions for how DFID could facilitate wider discussion on health research issues in Ghana with both national and international agencies.

 iv. The final report will be no more than 40 pages long, with a 3 page executive summary, and address all of the project objectives and questions.

 v. In addition, a comprehensive data set of the institutions and research groups identified as part of the exercise will be provided. Proposals should include options for providing a flexible database so that it could be taken up by partners to be updated and accessed widely.

21. Prospective suppliers should be aware of DFID's Open and Enhanced Access policy that requires that all DFID funded research should be irrevocable and freely accessible online to any user worldwide[7].

22. Personal opinions of the author or unsubstantiated claims made by organisations themselves will not be accepted.

Management Arrangements

23. DFID will manage the contract with the successful supplier through a lead official supported by a Reference Group. This group will be responsible for approving the project outputs, commenting on draft reports and arranging independent quality assurance of the project outputs. The Reference Group will contain (and is not limited to) the following officials:

    • DFID lead official: Rubbina Karruna (RED)
    • DFID representatives: Susan Elden (DFID Ghana);
    • Ghana Health Service, Research Division

24. The researcher (s) will also be expected to map potential stakeholders and plan for how to include them in the process of developing the reports and disseminating the evidence once the report is completed.

Dissemination

25. Sharing the findings of this project is important both with the Ghana Ministry of Health and DFID and more widely with the research community. Therefore we expect bidders to set out how they will communicate findings and engage with relevant stakeholders. We expect as part of the contract for the supplier to be available to present two separate seminars on the outputs of this research.

Skills and Qualifications

26. The essential competencies and experience that the supplier will need to deliver the work are:

    - Strong qualitative and quantitative research skills
    - A good understanding of health research in Ghana
    - A good understanding of the research uptake and dissemination avenues in Ghana

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[7] https://www.gov.uk/government/publications/dfid-research-open-and-enhanced-access-policy

- Familiarity with the wider research landscape and the research to policy processes in Ghana
- Strong analysis, report writing and communication skills

27. Desirable competencies and experience are:
- Experience in undertaking research mapping exercises

Risk management

28. The supplier will be expected to set out their understanding of the most important anticipated risks, with an explanation of their mitigation strategies for them in a full risk register. This includes anticipating which aspects of the mapping exercise could be contentious and proposing how to mitigate against these.

Timetable

29. This project is anticipated to take between 4-5 months to complete although the exact timeframe can be negotiated and we expect bidders to set out timings clearly in their proposal.

30. The project will begin in April 2014 and an indicative timeline for the tender process and project are set out below. However tenders should set out a more specific and detailed timetable within this framework with suggestions on milestone payments for key project deliverables.

Figure 1: Project timetable (dates subject to change) Milestones

Timescales

EOI invited	8th January
EOI deadline	28th January
EOI shortlisting deadline	3rd February
ITTs issued to shortlisted candidates	7th February
Full bids submitted	28th February
Tender evaluation panel	7th March
Preferred tenderer selected	10th March 2014
Project setup	April 2014
Inception report delivered	May 2014
Final report delivered	September 2014