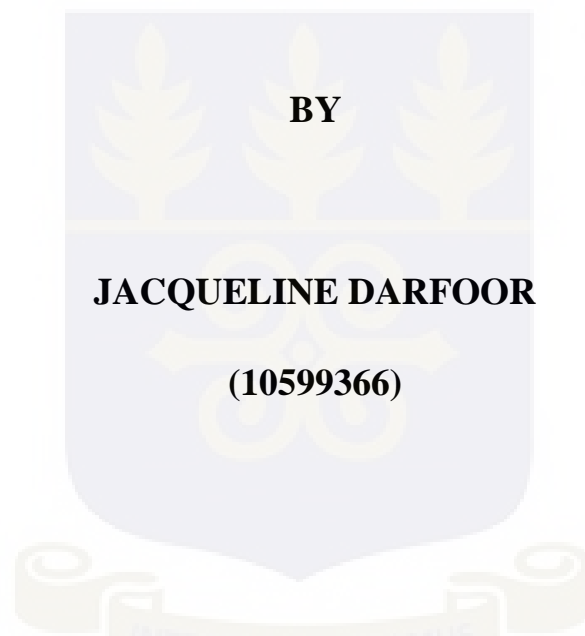


**SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA**

**ASSESSEMENT OF INTERNATIONAL FOCUS AND DISCOURSE
ON ANTIMICROBIAL RESISTANCE (AMR) AND INFLUENCE ON
LOCAL DECISION-MAKING ON AMR IN GHANA**



BY

JACQUELINE DARFOOR

(10599366)

**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF
GHANA, LEGON IN PARTIAL FULFILMENT OF THE
REQUIREMENT FOR THE AWARD OF MASTER OF PUBLIC
HEALTH (MPH) DEGREE**

JULY, 2017

DECLARATION

I, Jacqueline Darfoor hereby declare that excluding precise references which have been duly acknowledged, this submission is my own work towards my MPH dissertation and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University or elsewhere.

JACQUELINE DARFOOR

(STUDENT)

.....*Jacqueline*.....

SIGNATURE

.....
DATE

DR.PATRICIA AKWEONGO
(ACADEMIC SUPERVISOR)

Patricia Akweongo

.....
SIGNATURE

.....
DATE

DEDICATION

This work is dedicated to my son, Ezra Boakye Darfoor as a demonstration that your circumstances should never stop you from pursuing your dreams. It may not be as fast as you would want it, it may not be taking the path you planned, but wake up each day, determined to have another go at it!



ACKNOWLEDGEMENTS

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Finally, I wish to thank everyone out there who believes in me. You give me reason to want to be better each day.

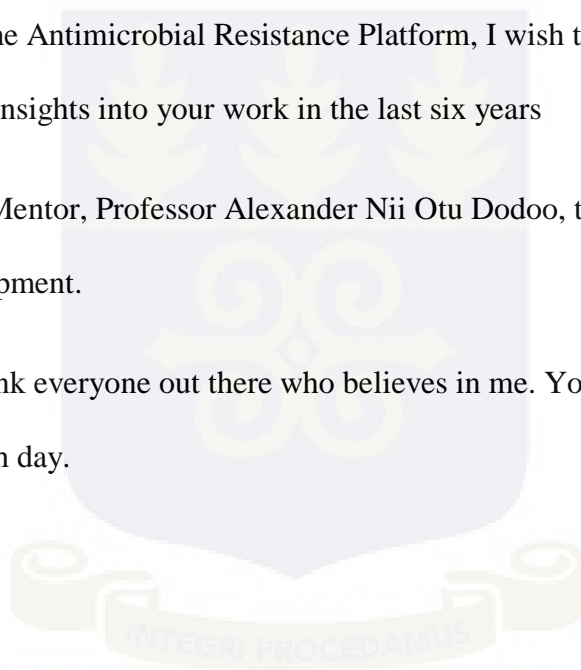
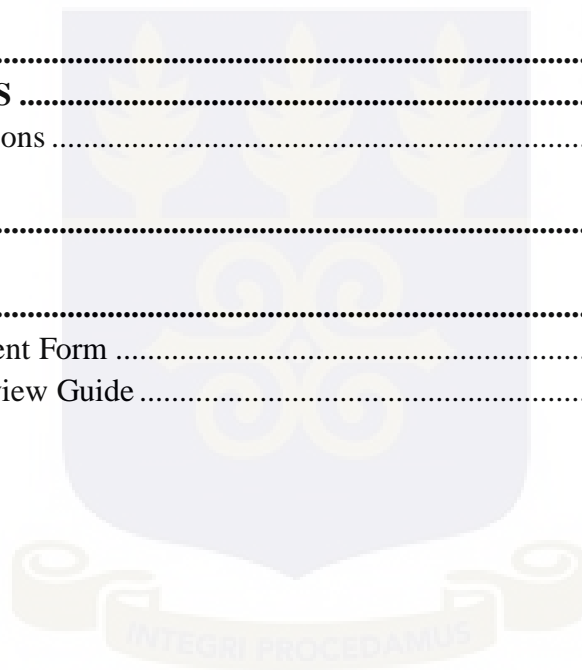


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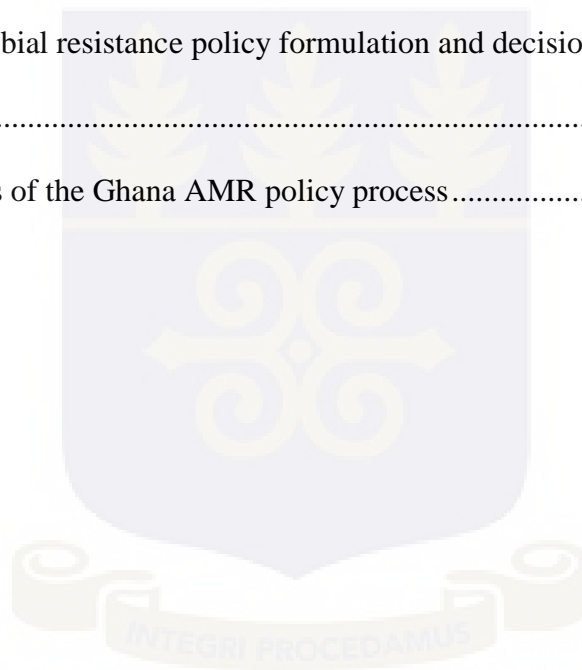
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LIST OF ABBREVIATIONS

ADMER	Antibiotic Drug Use, Monitoring and Evaluation of Resistance
AMR	Antimicrobial Resistance
AMU	Antimicrobial Use
ATLASS	Assessment Tool for Laboratory and Antimicrobial Resistance
CHAG	Christian Health Association of Ghana
CDDEP	Center for Disease Dynamics, Economics and Policy
CSD	Crop Services Directorate of MOFA
CSO	Civil Society Organization
DDD	Defined Daily Dose
DTC	Drug and Therapeutics Committees
ECOWAS	Economic Community of West African States
EML	Essential Medicines List
FAO	Food and Agriculture Organisation
FDA	Food and Drugs Authority
GARP	Global Antibiotic Resistance Partnership
GHS	Ghana Health Service
GLASS	Global Antimicrobial Surveillance System
GMA	Ghana Medical Association
GNDP	Ghana National Drugs Programme
GRNA	Ghana Registered Nurses Association
GSA	Ghana Standards Authority
HIV	Human immuno-deficiency virus
HRC	Health Research Centre
ICD	Institutional Care Division

IPC	Infection Prevention and Control
IPM	Integrated Pest Management
KATH	Komfo-Anokye Teaching Hospital
KBTH	Korle-Bu Teaching Hospital
KCCR	Kumasi Centre for Collaborative Research in Tropical Medicine
KII	Key Informant Interview
MDR	Multi-drug resistant
MERSTI	Ministry of Environment Science, Technology and Innovation
MeTA	Medicines Transparency Alliance
MOFA	Ministry of Food and Agriculture
MOH	Ministry of Health
MRSA	Methicillin Resistance Staphylococcus Aureus
NDIRC	National Drug Information Resource Centre
NHIS	National Health Insurance Scheme
OIE	World Organisation for Animal Health
PMAG	Pharmaceutical Manufacturers Association of Ghana
PPME	Policy Planning, Monitoring and Evaluation
PPRSD	Plant Protection and Regulatory Services Directorate
PSGH	Pharmaceutical Society of Ghana
RUM	Rational Use of Medicines
SDG	Sustainable Development Goals
STG	Standard Treatment Guidelines
TB	Tuberculosis
TH	Teaching Hospital
TTH	Tamale Teaching Hospital

TMPC	Traditional Medicine Practitioners Council
UG	University of Ghana
UN	United Nations
VSD	Veterinary Services Department
EPA	Environmental Protection Agency
WAAAR	World Alliance Against Antibiotic Resistance
WHA	World Health Assembly
WHO	World Health Organization



ABSTRACT

BACKGROUND: Antimicrobial resistance (AMR) is known to result in 700,000 deaths each year worldwide, mostly in low and middle income countries. Currently, Ghana faces a double disease burden from communicable and non-communicable diseases, coupled with poor monitoring of antibiotic use and weak regulatory systems. There is also a lack of capacity to link results of laboratory diagnostic tests to sale of medicines as well as uncontrolled veterinary use of antibiotics, compounding the problem. Discussions on AMR on the international stage have been ongoing since 1998 and yet countries have only recently begun to take action to contain AMR.

OBJECTIVES: The aim of this study was to assess how International antimicrobial resistance (AMR) discourse-influences local policies and decisions on AMR in Ghana.

METHOD: This was a descriptive cross sectional study assessing local AMR discourse and policies in relation to international discourse, as well as describes the decision – making process on AMR in Ghana. This was done by key informants’ interviews of purposively sampled key informants of the antimicrobial technical working group, using an interview guide. Documents reviews were done to supplement key informant interviews.

RESULTS:

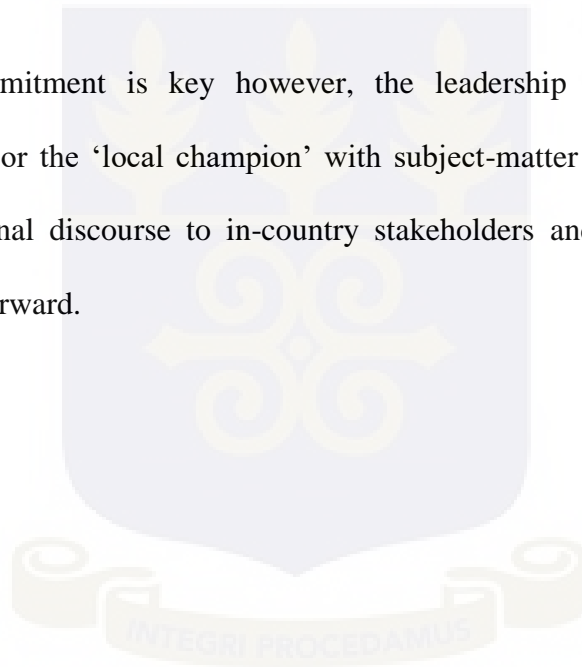
The draft antimicrobial resistance policy for Ghana followed international discourse and was similar to the global action plan on antimicrobial resistance from the World Health Organization (WHO). It had five key overarching elements similar to that of the global action plan. The study also found that international discourse influenced the content,

policy-formulation and decision-making process of Ghana's draft policy as did other factors like political situation, local situation and local process-drivers

CONCLUSION:

Policy decisions are not only influenced by international discourse but the ability of the key players and policy formulators to understand and interpret what international discourse seeks to achieve and contextualize it to local prevailing country situations, the prevailing health systems and capacity for implementation of actions from international discourse.

Also, political commitment is key however, the leadership that drives the policy formulation process or the 'local champion' with subject-matter exposure and ability to demystify international discourse to in-country stakeholders and rally support is what moves the process forward.



CHAPTER ONE

1.1 Introduction

Old and existing antimicrobial agents are being rendered ineffective in the management of certain infections and there are no newer agents to rely on, for infection control. The ultimate consequence of Antimicrobial Resistance (AMR) is morbidity and mortality that could have been prevented.

At present, global burden of deaths of 700,000 people per year is estimated from AMR. These occur mainly in low and middle income countries. (Carlet, Pulcini, & Piddock, 2014). It is however estimated that by 2050, the global burden of drug resistance will lead to a mortality rate of 10 million lives per year. This figure is greater than even the current burden of Cancer. (Carlet, Pulcini, & Piddock, 2014)

Though AMR is a global problem, Africa appears to be the worst hit, with resistance reported in Nigeria, Uganda, Tanzania, Ghana and South Africa. (Newman, Frimpong, Donkor, Opintan, & Asamoah-Adu, 2011). Most of these countries have reported AMR to very common and accessible antimicrobials like ampicillin, tetracycline and clotrimazole.

In Ghana studies have shown resistance to drugs from two of the nation's teaching hospital, Komfo Anokye Teaching Hospital (KATH) and Korle Bu Teaching Hospital (KBTH) (Newman et al, 2011). Other studies in Ghana have also reported multi-drug resistant strains to *Pseudomonas aeruginosa* (22.7%), *Acinetobacter* spp (64.8%), *Citrobacter* Spp (65.0%), *Streptococcus pneumonia* (7.8%), *Escherichia coli* (69.5%), *Salmonella typhi* (62.4%) , Non Typhoidal *Salmonella* spp (60.3%), *Klebsiella* spp (57.6%), *Proteus* spp (55.9%), *Neisseria gonorrhoeae* (11.8%), *Staphylococcus aureus* (42.4%) in several Teaching, regional and district hospitals (Newman et al., 2011). Resistance to tetracycline (67%), norfloxacin (40%), moxifloxacin (37%), erythromycin

(37%), clindamycin (33%), gentamicin (30%), kanamycin (30%) and ceftaroline (20%) have also been reported in the southern part of Ghana (Egyir et al., 2015). Multi-drug resistance is also reported in Ghanaian Tuberculosis (TB) patients (23.5%) (Indies, Guiana, Guiana, & Plan, 2006)

Anti-microbial resistance thus poses a threat to the attainment of goal 3 of the sustainable development goals (SDG), which focuses on good health and well-being. (WHO, 2016a). International discourse on antimicrobial resistance has been ongoing since 1998 (Leung et al, 2011) and in September 2016, the United Nations General assembly for the fourth time in its sitting history focused on AMR and the need for a multi-sectorial and cross-sectorial approaches for containment (UN 2016; WHO, 2016a). Since then, there has been a re-affirmation of commitment by countries to have in place national AMR plans in tandem with the ‘Global Action Plan on Antimicrobial Resistance’ developed in 2015 by the WHO.

The WHO containment package for AMR has six areas of focus and the first overarching component is for governments to commit to have in place a national action plan on antimicrobial resistance that is comprehensive enough and captures all the measures. Also a national inter-sectoral steering committee has to be set up to provide guidance on actions by several stakeholders under the overall stewardship of the government. There is also the need for a framework for accountability to be set up, as well earmarking appropriate resources (Leung et al., 2011). For countries like Ghana however, the pace is even much slower (Frimodt-Moller, 2011).

Ghana has an antimicrobial resistance working group in place and a draft antimicrobial policy presented to the cabinet of the nation (Gyansa-lutterodt, 2013). AMR however, is a global problem and containment will by no means be achieved by isolated individual

efforts but by a harmonization of national, regional, international, multi-sectorial and cross-sectorial efforts. In order to assess progress made in AMR in Ghana, understanding how the discourse at the international level has influenced the draft policy for Ghana and the decision-making process may be relevant for formulating future policies and direction. It is also essential to know how the draft AMR policy aligns with the Global Action Plan on Antimicrobial Resistance and the gaps that need to be addressed. This study therefore sought to describe the current draft policy on AMR containment and how it aligns with international discourse and the WHO policy package for AMR containment. It also sought to shed light on the decision-making process on local translation of international AMR Discourse.

1.2: Problem Statement

Antimicrobial Resistance, coupled with lack of discovery of new antibiotics, poses a major threat to global health and has a burden on other major priorities such as human development (Carlet et al., 2014). At present, the consequence of infections by antimicrobial-resistant pathogens leads to an estimated death of more than 700 000 people annually, mostly in low- income and middle-income countries (Hoffman et al., 2015). This figure is predicted to increase to 10,000,000/year by 2050 (more than the current burden of cancer) (Hoffman et al., 2015), and a cumulative \$100 trillion in economic output (The Lancet Infectious Diseases, 2016) In high-income countries, annual deaths from resistant pathogens are estimated to be 23,000 and 25,000 in the USA and Europe respectively. In the USA, the excess cost of antibiotic-resistance infections is around \$20 billion per year (The Lancet Infectious Diseases, 2016).

With AMR being of global concern for over a decade now, the World Health Assembly (WHA) adopted a resolution which suggested that action should be taken against AMR, by

member states in 1998 (World Health Organization, 2001). Ghana faces a double disease burden from communicable and non-communicable diseases (Gyansa-Lutterodt, 2013). This has been allowing for goods to move freely within the Economic Community of West African States, (ECOWAS). There is also a lack of capacity to for dispensing of medicines to be informed by laboratory tests, as well as uncontrolled veterinary use of antibiotics.

Moving policy to action however remains a challenge. There is a strategic need to assess the challenges related to implementation and the influence of international discourse on the AMR policy. This study seeks to assess existing local policies and implementation plans on AMR in Ghana and how this aligns with international discourse.

1.3 Objectives

General objective:

To assess International AMR (antimicrobial resistance) discourse-influence on local policies and decisions on AMR.

Specific Objectives:

1. To describe current local policy on AMR containment.
2. To assess the content of AMR plan for Containment of AMR in Ghana.
3. To shed light on the decision-making process on local translation of international AMR Discourse

1.4 Conceptual Framework

To reduce antimicrobial resistance in Ghana, there is the need for policies on AMR that reflect measures of containment.

AMR discussions at the international level, in different forms and by different organizations, including the World Health Organization (WHO), the United Nations and

World Health Assembly are ongoing. Strategies for containment of AMR are already in place by these organizations (WHO, 2001). The WHO containment package for AMR has six main areas that focus on commitment of various governments to develop and finance a comprehensive national AMR plan with involvement of civil society, strengthening of surveillance and laboratory capacity, ensuring uninterrupted access to essential medicines of assured quality, regulation and promotion of rational use of medicines, including animal husbandry and ensuring proper patient care , enhancing prevention of and control of infections and finally, promoting research and development of new drugs. (Leung et al., 2011) . Anti-microbial resistance discussions at the international level will result in enhanced local AMR discourse and adoption of containment strategy by member countries, resulting in influence on the local decisions and local policies such as the draft AMR policy. Policies will reflect strategies for access to antimicrobials, prevention of infections, regulations to establish effective dispensing of antimicrobials, encouragement of vaccine development, and allocation of resource to implement intervention to contain resistance, development of standard treatment guidelines, essential drugs list and increased immunization coverage to prevent infections.

All of these efforts will collectively bring about containment in AMR. Results of data from 55 countries in low and middle income countries, indicate that putting in place a national strategy for containment of antimicrobial resistance is associated with a reduced incidence of use of antibiotics in acute diarrheal illness by 30% .(Holloway, Rosella, & Henry, 2016)

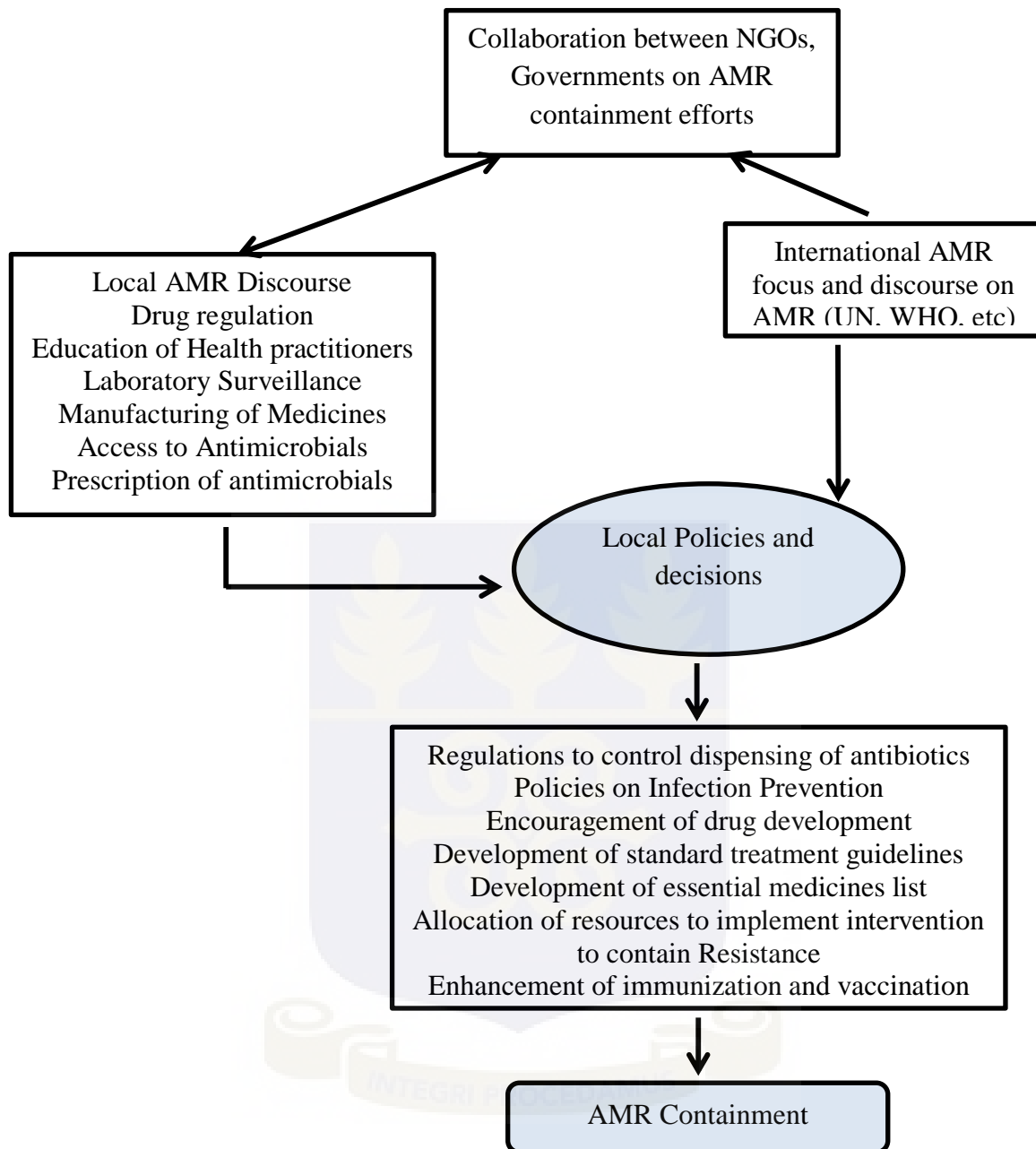


Figure 1: Conceptual Framework depicting the relationship between International AMR discourse and AMR policies and decision-making on AMR in Ghana

1.5 Justification of Study

This study may highlight Ghana’s AMR policies and decisions, in relation to the recommendations by the international communities of which Ghana is a part. Findings of the study may be used by policy makers to address policy gaps for the containment of

AMR in Ghana, ahead of the acceptance of the draft AMR policy first presented to cabinet in 2015.



CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Antimicrobial Resistance in Humans

Antimicrobial resistance (AMR) refers to the phenomenon where microorganisms, typically, fungi, bacteria, parasites and viruses undergo changes upon being exposed to anti-microbial agents or drugs such as antifungals, antibiotics, anthelmintic, antimalarial and antivirals. This renders the antimicrobial agents ineffective against the microorganism, resulting in the persistence of infections in individuals and the spread to others (WHO, 2016). This is coupled with the lack of development of new antimicrobial agents with different mechanisms of action from existing ones.

The resultant effect is that whereas old and existing antimicrobial agents are being rendered ineffective in the management of certain infections, there are no newer agents to rely on, for infection control. The ultimate burden of AMR is morbidity and mortality that could have been prevented.

Antimicrobial resistance has been reported in almost every country with cases in Nigeria, (Byarugaba, 2004) (Adesoji, Ogunjobi, Olatoye, & Douglas, 2015) Australia (Carlet et al., 2014) New Zealand (Pullon et al., 2016) (Bryan, 2011), India (Laxminarayan & Chaudhury, 2016) (Elmahdi, DaSilva, & Parveen, 2016), Lesotho (Maama-Maime et al, 2015) (Ciorba, Odone, Veronesi, Pasquarella, & Signorelli, 2015), Ghana (Newman et al, 2011), China, UK, South Africa, Thailand (Elmahdi et al, 2016).

There is a reported treatment failure of third generation cephalosporin antibiotics in the treatment of gonorrhoea in at least 10 countries (Australia, Austria, Canada, France, Japan,

Norway, Slovenia, South Africa, Sweden and the United Kingdom of Great Britain and Northern Ireland) (Jean Carlet et al., 2011) .

Community Acquire *Methicillin Resistance Staphylococcus aureus* (MRSA) strains have also been isolated in healthcare settings (Jean Carlet et al., 2011)

Drug resistance to anti-tubercular agents has also been detected in multiple countries. Studies have shown resistance of microorganisms to pyrazinamide in patients with MDR TB in countries ranging from 49% in Thailand, 52% in South Africa, and 55% in Taiwan to 85% in South Korea (18–21%)(Kurbatova et al., 2015). Studies in Lesotho done with 984/3441 (28.6%) people revealed that MDR-TB was detectable in 24/773 (3.1%) of new TB cases and 25/195 (12.8%) of retreatment TB cases.

Acute respiratory infections, malaria, measles, diarrhea, TB and HIV/AIDS are responsible for nearly 85% of mortalities due to infections (WHO, 2001) Unfortunately, there is the emergence of resistance strains to first, second and sometimes, third line drugs for infection control. This leads to treatment failures, prolonged hospitalization, and deterioration of conditions that could have otherwise been managed with basic antimicrobials and ultimately death.

Prolonged hospitalization results in increased cost of healthcare and risk of acquisition of nosocomial infections.

2.2 Antimicrobial Resistance in Animals

Animals are not exempt from the spread and challenges and several studies have reported presence of multi-resistance strains of salmonella in Swine in Southern Africa (Iwu, Juliana, Chuks, Chikwelu, & Kotze, 2016). In Ghana, there was detection of *E. coli* in local and imported chicken. (Rasmussen, Opintan, Frimodt-m, & Styrihave, 2015), E-coli

in German livestock (Irrgang et al, 2016). Antimicrobial resistant strains have been detected in animals also. This is largely due to the fact that significant amounts of antibiotics have been utilized in treating infections in farm animals and aqua-culture. Disease-causing micro-organisms from the animals are transmitted to humans either through food, direct human contact or the environment, via farm effluent (Roca et al, 2015).

Usually, the presence of resistant strains in animals meant for food can cause infections in humans that are difficult to treat or manage (WHO, 2001).

2.3 Presence of Antimicrobials in the Community and Environment.

Environmental antibiotic pollution has resulted in transfer of resistant genes to pathogenic bacteria and human commensals. Studies in India have identified waste water-treatment plants linked to manufacturing plants meant for antibiotic production as responsible for transferring resistant genes into human microbiota.

2.4 Monitoring of Antimicrobial Resistance Locally

Due to migration, resistant strains are able to move from country to country and so global monitoring is essential. Measures for local monitoring and containment are however very important because practices differ from country to country and the dissemination of resistant strains are rooted in practices that pertain locally and an intervention that leaves out local measures may not be appropriate. Also, local monitoring and containment measures are what feeds into global surveillance (O'Brien, 1997). As at 2014 however, a study done in 134 countries in World Health Organisation (WHO) regions showed only 34 countries with a national plan that was robust enough to contain antimicrobial resistance. Only 26 respondent countries in the WHO Americas region had a national plan with just eight in Africa and none in the Eastern Mediterranean region, which spans from Morocco

to Pakistan. The WHO's European region however had 21 of 49 respondent countries and 5 of 11 in its South East Asia region. (Gulland , 2015).

2.5 The Approach to Antimicrobial Resistance and Containment

The underlying principle is that usage of antimicrobials will eventually result in antimicrobial resistance and hence inappropriate usage will expedite the emergence of resistance and subsequent spread. The strategy to contain resistance is as a result, based on rational use of drugs. This refers to use of antimicrobials in a way that is cost –effective enough to optimize therapeutic effect and minimize antimicrobial resistance as well as drug- related toxicity. There are several determinants that influence the use of antimicrobials.

These may be in relation to the patient, the prescriber or the infection, the quality of microbial agents, availability and non-availability of antimicrobial.

On the part of the prescriber and patient, the type and severity of the disease, diagnostic services used or unused, prescription pattern of prescriber, client expectation and whether or not a patient adheres to given regimen also influence antimicrobial use. (Simonsen, Tapsall, Allegranzi, Talbot, & Lazzari, 2004). On another hand also, the regulatory framework in place for medicines, procurement, systems in place for quality assurance and management also serve as determinants of rational drug use and quality assurance systems (Leung et al., 2011) (Essack, Desta, Abotsi, & Agoba, 2016) (Simonsen et al., 2004).

.Fortunately, there are public health interventions available for tackling AMR emerging from all the factors describe above be it in relation to the patient, the prescriber or the infection, the quality of microbial agents, availability and non-availability of antimicrobial. To control infection, measures can be put in place to prevent, control and promote use of diagnostic testing, ensure the right treatment regimens are given, as well as

promotion education of consumers on health and adherence. To contain resistance from the angle of antimicrobial medications, there is the need for adequate and enforceable regulations relating to drugs development of essential medicines list as well as systems put in place to monitor the drug approval and supply chain (Simonsen et al., 2004). The WHO recommendations to contain antimicrobial resistance include the listed in table 1.

Table 1. WHO Recommendations for AMR containment

Target group	Recommended interventions
Patients and the public	Disease Transmission and hygiene education, as well as promotion of rational use and discouragement of self-medication
Prescribers and dispensers	Education on appropriate use Regulating, supervising and monitoring professionals, as well as provision of tools like formularies and guidelines to support their decisions
Health-care systems	Setting up infection prevention and control(IPC) and therapeutic committees Provision of guidelines for surveillance and use of antimicrobials Laboratory networks for surveillance of antimicrobial resistance
Government, policies, strategies, and regulations	Commitment to have a budget for antimicrobial resistance, as well as a task force To have in place national policies for drugs such as the standard treatment guideline (STG) and essential drug list (EDL Registration of all outlets for medicines and regulation to ensure that antimicrobials are dispensed by prescription only and by an approved staff. Quality assurance for antimicrobials and appropriate resistance data for licensing. Undergraduate and continuing resistance education. Access to information on drugs that is evidence-based
Pharmaceutical industry	Research and development incentives. Producing medicines based on good manufacturing practice standards. Supervising and monitoring promotion of drugs
Non-human antimicrobial use	Resistance surveillance. Education of veterinary practitioners and farmers. Prohibition of growth promoters

Source : (Okeke et al, 2005)

2.6 Approach for AMR Containment in Animals and Limitation of Spread of Bacteria in Animal Farming.

This can be achieved by tackling the root cause of the problem. Use of antibiotics as growth promoters should be banned (reference and by who should it be banned). Improvement of hygienic practices along the food chain, as well as improving bio-securities in farming could also aid in containment (reference). At the thrust of the issue is also ignorance on the part of farmers and hence organization of educational programmes for farmers and food handlers will keep AMR in check. (Roca et al., 2015)

2.7 International Discourse on Antimicrobial Resistance

Antimicrobial resistance (AMR) is not a novel phenomenon or concept. In his acceptance speech for his Nobel Peace prize, Sir Alexander Fleming predicted that there was going to be such a phenomenon as microorganisms that were unresponsive to microbial agent traditionally known to combat them (The Lancet Infectious Diseases, 2016).

It was however not until 1998, that a first mention was made of AMR on the international stage when the World Health Assembly (WHA) adopted a resolution, which suggested that action should be taken against AMR, by member states. In 2001, a global strategy for containment of Antimicrobial resistance was published by WHO. This had recommendations for defining and implementation of national policies that will respond to AMR. The year 2005 saw yet another WHA resolution on AMR. In this resolution, there was a caution about slow progress being made and a call for antimicrobial agents to be used rationally. AMR was also selected as the World Health Day theme by WHO in 2011 . (Leung et al., 2011)

The Joint Programming Initiative on Antimicrobial Resistance made up of 18 countries, is also focusing on scientific collaborations that will aid in answering the necessary

questions that relate to AMR. The World Alliance Against Antibiotic Resistance (WAAAR, France), Antibiotic Action (UK), ReAct (Sweden) and the Antibiotic Resistance Initiative (ISGlobal, Spain), among others, are non-profit organizations that are contributing to the process (Roca et al., 2015).

2.8 Conclusion

Antimicrobial resistance is not a novel phenomenon. Many studies have focused on antimicrobial resistance in humans and animals, the approach for containment at the global level, as well as measures that some specific countries are putting in place for containment of antimicrobial resistance. Despite these, national policies targeted at containment is rare. Discourse on Antimicrobial resistance informs many health policies, at both local and national level. Though many papers and articles concerning the topic at large exist, there are few studies with descriptive, qualitative approach in this part of the world.

Future studies may highlight Ghana's AMR policies and decisions, in relation to the recommendations by the international communities of which Ghana is a part. Such findings may be useful for policy makers to address policy gaps for the containment of AMR in Ghana.

CHAPTER THREE

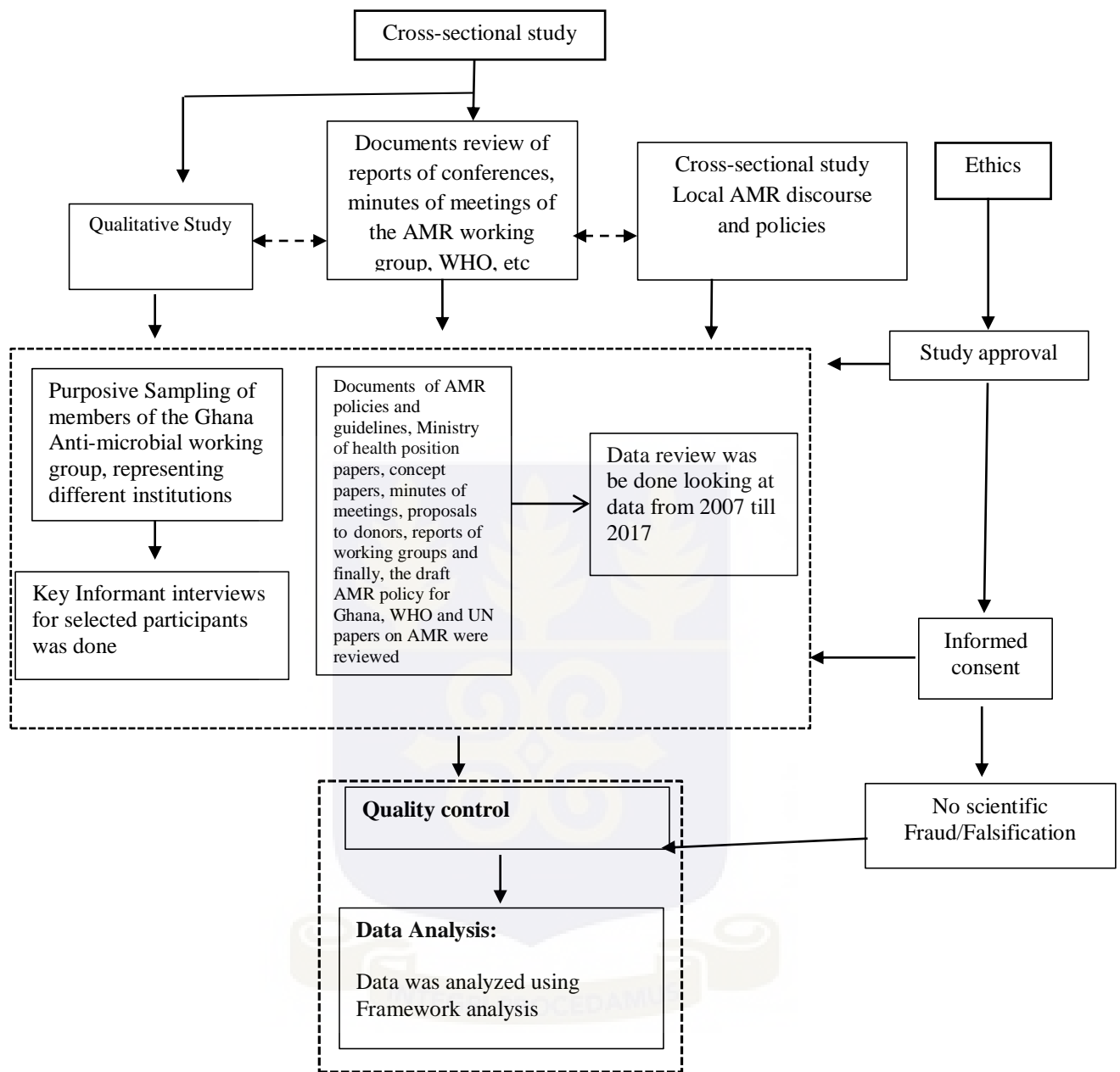
3.0 METHODS

3.1 Study Design

The study was a descriptive cross sectional design that sought to assess local Antimicrobial Resistance (AMR) discourse and policies in relation to international discourse, as well as describe the decision –making process on AMR in Ghana. It was a qualitative study (Figure 2).



Figure 2: A schematic diagram of the proposed study design



3.2 Study Area

The study was conducted in Ghana. Ghana is a West African country bordering Cote D’Ivoire, Burkina Faso, Togo and the Gulf of Guinea. The population of Ghana as of the last census held in the country in 2010 was 24,658,823. (Census, 2010). There are 1710 public health facilities and 834 Private health facilities in Ghana(“Sector Report Health and Life Sciences Ghana,” 2014) , from which prescriptions for antibiotics are likely to be

generated. Ghana has antimicrobial policy however a draft antimicrobial policy has been presented to the nation's cabinet, since 2014, pending approval. Ghana however has a standard treatment guideline, which serves as a guide to prescription of various medicines, including antibiotics, for various ailments. Ghana is a WHO member state and also a UN member state and hence a member of the UN general Assembly. The WHO and recently, the UN, have been spearheading discussions on AMR.

3.3 Study Population

Institutions involved in the AMR policy formulation process in Ghana, were included in the study. These mainly comprised of public policy formulators, researchers, donors, civil society, representatives of the pharmaceutical sector, representatives of the medical sector and laboratories, and representatives of the FDA. The criterion for recruiting people unto the study was based on their direct involvement in the policy formulation process either by research, design or implementation of AMR.

The main institutions involved in the study were the Ministry of Health (MOH) and its agencies such as the Ghana National Drugs Program (GNDP), Ghana Health Service (GHS), Pharmacy Council and the Food and Drugs Authority (FDA). These institutions are responsible for AMR policy formulation in Ghana and have representatives on the Antimicrobial working group for Ghana. The Study also included Society for Private Medical and Dental, Ghana for Private sector perspectives, as well as international agencies like WHO and the United Nations (UN), for their perspectives since they have been responsible for steering international discourse on AMR. The selection of these institutions was based purely on their functionality and their involvement in policy formulation in Ghana or their role in international AMR discourse.

3.4 Sampling Method

Key informant Interviews: Purposive sampling was used in the selection of key informants from selected institutions involved in AMR policy formulation process in Ghana. Purposive sampling was used because of the need to select key informants who were knowledgeable in the AMR policy formulation process. These intuitions were mainly the Ministry of Health and its agencies such as the Ghana Health Service (GHS), and Ghana National Drugs Programme (GNDP), and pharmacy council. A representative from the World Health Organisation (WHO), as well as the Food and Agricultural Organisation of the United Nations (FAO) was each interviewed. During the course of data collection names of other key informants who had not been previously sampled came up and three of such, mainly from the Plant Protection and Regulatory Services Division (PPRSD), Environmental Protection Agency (EPA) and the Veterinary Services Department (VSD) came up through snowballing effect and these were interviewed as well. A total of 20 persons from the selected institutions were purposively sampled and interviewed.

Documents Review:

The global action plan on antimicrobial containment, report on WHO World Health Day in 2011, as well as reports on the 71st UN General Assembly held in September, 2016 were all reviewed. A report on the AMR ministerial meeting in The Hague in 2014 was also reviewed. The report of the African Conference on Antibiotic Use and Resistance in 2015 was also reviewed to support the Key Informant Interviews (KII) interviews. Reports on these years were chosen because these were years that there was AMR discourse on the international level and also captures the period of the AMR policy formulation process in Ghana. The draft AMR policy for Ghana, minutes of meetings of the Antimicrobial work group, position papers and report were also reviewed.

3.5 Sample Size

Purposive sampling of 18 key informants, who had the capacity to address the issues and answer questions pertaining to the study, was done however a total of 20 key informants were interviewed due to the fact that names of certain people came up during the interviews through snowballing effect that had to be interviewed. A total of 20 key informants were interviewed and a total of 20 documents were also reviewed.

3.6 Study Variables

Outcome Variable: - Local decision-making on AMR in Ghana (This was measured by looking at incorporation of or otherwise, of key elements of AMR discourse globally, within the last ten (10) years, in the Ghana AMR policy formulation process). Ten years was chosen because the first WHO strategy for AMR containment for its member countries was done in 2005 and it was useful to see if measures were taken to include key elements of the strategy in local policies and decisions on AMR). Also, the Ghana AMR policy formulation process was started in 2011 and so looking at decisions within this timeframe gave room for things that were done prior to initiation of the policy formulation process, as well as the policy formulation process itself to be captured.

Exposure Variable: - International Focus and Discourse on Antimicrobial Resistance (AMR)

Key elements of International discourse on AMR containment are listed. Documents review of local policies, as well as interview of key informants were done to ascertain if there are policies captured on the below list.

1. Commitment of governments to a national AMR plan that is holistic and resourced. There should also be accountability and involvement of civil society.

2. Improving surveillance and the capacity of laboratories.
3. Ensuring consistent supply of good quality medications.
4. Regulation and promotion of rational medicine use, both in humans and animal husbandry and ensuring appropriate care of patients.
5. Improvement of prevention and control of infections.
6. Promotion of innovations, research and development.

3.7 Data Collection Techniques\ Methods and Tools

3.7.1 Qualitative

The main data collection tool employed was a key informant interview guide. A preliminary face-to face meeting was scheduled with key informants to orient them on the study and invite them to participate. Upon acceptance, they were made to complete a consent form. An appointment was then booked separately with each informant for a face-to-face interview. The interview was conducted using an interview guide made up of open-ended questions. Four (4) participants however were out of town during the period of the investigation and hence a telephone interview was scheduled and done with these participants. The interview guide was centered on local AMR discourse, the policy-decision making process and the draft AMR policy for Ghana. The guide was pre –tested on one volunteer from the Ministry of Health (MOH), who had had some minimal involvement in the draft AMR policy formulation. Each interview was done separately, spanning about 30 to 45 minutes. The responses were captured on paper. A recorder was also used to record the full interviews, to capture anything that may have been missed in writing.

The interviews were augmented with documents review. Documents reviewed included the draft AMR policy, existing guidelines, reports from international conference such as

World Health Assembly (WHA), 71st United Nations General Assembly report, minutes of meetings, reports of working groups, the Global action plan on AMR , the draft National Action Plan on AMR and finally, the draft AMR policy for Ghana.

Table 2. List of Respondents by Agency/Role in Relation to AMR

N0.	Key Informant/Institution	Number
1.	Representative of the Ghana Health Service	1
2.	Representative from the Ministry of Health	2
3.	Representative of the Ghana National Drugs Programme(GNDP)- The Programme Manager	2
4.	Representative from Academia	1
5.	Representative of the Medical Sector (Society for Private Medical and Dental Practitioners)	1
6.	Representative of the UN (FAO)	1
7.	Representative of WHO	1
8.	Representative of the EPA	1
9.	Representative of the Plant Protection and Regulatory Services	2
10.	Microbiologist (Professor of Microbiology from the University of Ghana)	1
11.	Representative of Civil Society (Hope for Future Generations)	1
12.	Representative of Veterinary Services department	1
13.	Representative of WHO-Collaborating Center for Pharmacovigilance in Africa	1
14	Chairman of the antimicrobial working group	1
15	Representative from the hospitals	1
16	Representative of the FDA	1
17	Representative of the pharmacy Council	1
18	Representative of the pharmaceutical sector	1

3.8 Quality Control

Data Collection: - An interview guide was used to guide the direction of the KI interviews, to avoid missing out any information. Also, the effect of recall bias was minimized by using documents review as an additional data collection source.

Interview guide was pretested using one person from the MOH, who had had minimum involvement in the policy-formulation process..

Data Entry: - Permission was sought from participants to record the interviews using a recorder. Transcription of the interviews was done manually, within 24 hours of each interview, to avoid leaving out details, or misinterpreting captured details due to forgetfulness of discussions.

3.9 Data Processing and Analysis

Recordings of interviews were transcribed and compared with what was written on paper to capture one record for each interview. A review of the transcripts was done by playing each recording and comparing it to the corresponding transcript. Key informants were further contacted on phone to fill in missing piece of information or clarify points that seemed distorted. Participation in one platform meeting of the antimicrobial resistance working group was also done to observe proceedings and further gather information. This also provided the opportunity to verify contradicting information from two informants and also clarify some aspects of the data that was gathered from documents review. The information was manually separated into themes in a form that enabled the information to be coded. Manual coding and analysis was done.

Framework analysis was used in analyzing the data. Framework analysis was used because this study was an applied policy research which sought to identify the gaps in the AMR policy-formulation and decision-making process in relation to international discourse and framework analysis has proven to be an effective analytical method for deducing recommendations with respect to given policy issues, especially within limited time periods or time constraints. Due to its flexibility in nature, framework analysis therefore allowed for what was already known to be included in the analysis, whilst enabling for

inclusion of emerging data also in the analysis. Framework analysis is also very extensive in nature and allowed for review of entirety of the data collected, rather than a mere fragment (Srivastava et al, 2009). It also allowed for me to start with a theme and yet allowed for emerging themes to be also incorporated into the analysis. The main stages were familiarization, during which period there was acquaintance with the data and information obtained from the field by going through notes, recordings and transcription. This was followed by identification of a theme framework, based on issues that emerged from the data set during the familiarization stage and the original research objectives. Indexing also followed. This entailed identification of sets or aspects of the data that aligned with a specific theme. Charting, during which the indexed information was transferred from text and organized into charts with headers followed. Finally, mapping and interpreting of the work was done. The important elements were then analyzed and outlined into charts. A flow chart detailing the decision-making process of local translation of international discourse on AMR was also done. Factors that affected the decision making process were then described and listed.

3.10 Ethical Considerations

Ethical approval was obtained from the Ghana Health Service Ethical review committee, before the commencement of data collection.

3.10.1 Study Area Approval

Permission was also sought from chairman of the Antimicrobial working group, from which key informants were picked, using an introductory letter from the School of Public Health, Legon.

Permission was also sought from the WHO and FAO country offices, to interview some key informants, using an introductory letter from the School of Public Health, Legon.

3.10.2 Subjects Involved in the Study

The study involved purposively sampled key informants from the Ministry of Health and its agencies including the Ghana National Drugs Programme(GNDP), the Food and Drugs Authority(FDA),representatives of the WHO and the UN, representatives of the EPA, PPRS and VSD.

3.10.3 Potential Risks/Benefits of the Study

No risk to participants was anticipated apart from the loss of 45-60 minutes of time during the period of conducting the interviews. The study would however shed light on how the draft AMR policy aligns with the Global Action Plan on Antimicrobial Resistance and the gaps that need to be addressed, as well as the decision-making process on local translation of international AMR Discourse and how our processes could be made better..

3.10.4 Consenting

A preliminary phone call was placed to all participants to orient them on the study and invite them to participate. A face-to-face meeting was then held with all participants individually, with the exception of four participants who were out of town during the period of the study. They were informed of the fact that there was no potential risk to them by enrolling in the study, apart from the loss of time during the interview period. The benefits of the study were also clearly outlined, as well as their right to decline to participate, after which their consent was sought. Upon acceptance, they were made to sign a consent form to indicate consent (Apendix1). They were also assured of confidentiality of the information provided by them.

3.10.5 Privacy and Confidentiality

A study code was used instead of the names of participants, to maintain confidentiality. However, a list that links the names and the codes was created solely for the research purpose, to be destroyed immediately after the project.

Direct responses included in the final report are devoid of any identifying information.

The data was stored on a recorder and kept in a safe. Transcriptions were stored in a password protected file on a laptop.

Findings of the research will be published and also shared with participating institutions.

3.10.6 Data Storage/Security

The data will be stored in a safe, with access to only the Principal investigator (PI), for three years, after which it will be destroyed.

Electronic versions of the data collected will be password-protected.

3.10.7 Data Usage

Findings of the research will be published and also shared with participating institutions.

3.10.8 Voluntarily Withdrawal

Participants in the study had the right to withdraw at any time without any consequences. Should they choose to withdraw, the information they provided will not have been used in the study. Respondents were entitled to ask questions at any point in the study for clarification. Any aspect of the questions that was not well understood was clarified by the interviewer.

3.10.9 Compensation/Payments

KI's were not compensated for the time used for the interviews.

3.10.10 Conflict of Interest

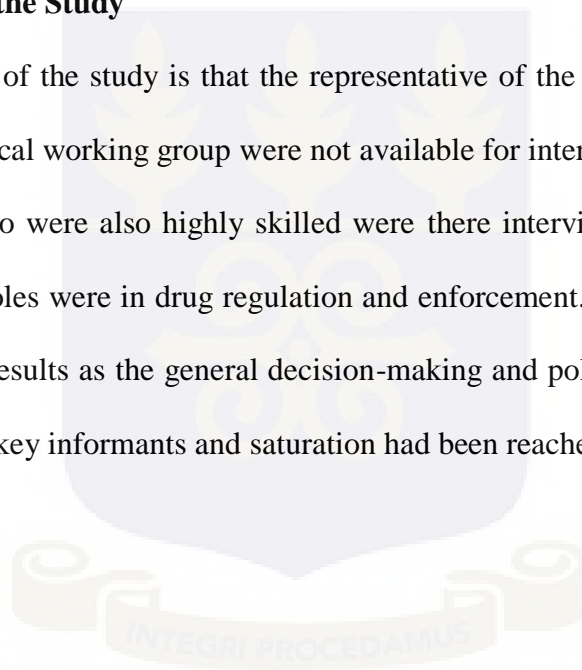
None

3.11 Pre-Test

A trial of the questions was done by interviewing a volunteer who had had minimal involvement in the AMR draft policy formulation process for Ghana.

3.12 Limitations of the Study

One main limitation of the study is that the representative of the FDA and the pharmacy council on the technical working group were not available for interviews. Other workers in these institutions who were also highly skilled were there interviewed, to give a general view of what their roles were in drug regulation and enforcement. This however had very little impact on the results as the general decision-making and policy formulation process is provided by other key informants and saturation had been reached in that regard.



CHAPTER FOUR

4.0 RESULTS

Of the 20 key informants interviewed, 12 of them were males and 8 were females. Most participants were from the national drugs programme and the regulatory offices. There were 2 representatives from the United Nations such as the World Health Organization and the Food and agricultural organization. One representative from the Veterinary Services Department, who doubled as the focal person for the World Organisation for Animal Health (OIE) was also interviewed. A microbiologist, representatives from the Kwame Nkrumah University of Science and Technology (KNUST) and pharmaceutical sector were also interviewed.

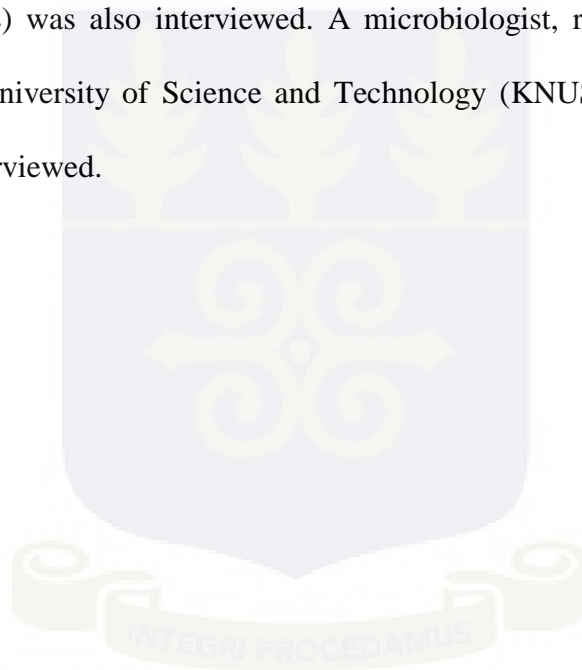


Table 3. Characteristics of Study participants

No	Sex	Institution	Designation/Role
1	Female	Ministry of Health (MOH)	Director for Pharmaceutical Services
2	Male	Ministry of Health (MOH)	Officer
3	Female	Ghana National Drugs Programme (GNDP)	Programme Manager
4	Male	Ghana National Drugs Programme (GNDP)	Officer
5	Male	Ghana Health Service	Officer
6	Male	National Drug Information Resource Centre (NDRIC, GHS)	Officer
7	Female	University of Ghana Medical School (Microbiology Department)	Professor
8	Female	World Health Organisation (WHO)	Essential Medicines Contact
9	Male	Food and Agricultural Organisation of the UN	Focal Person for Ghana
10	Male	Society for Private Medical and Dental Practitioners	President
11	Male	Veterinary Services department	Veterinary Doctor and Focal person for WHO and OIE on animal Health
12	Female	Plant Protection and Regulatory Services (PPRSD)	Regulatory Officer
13	Male	Plant Protection and Regulatory Services (PPRSD)	Regulatory Officer
14	Female	Food And Drugs Authority (FDA)	Regulatory Officer
15	Male	WHO Collaborating Centre For Pharmacovigilance In Africa	Director
16	Female	Coalition of NGOs In Health	Representative
17	Female	Police Hospital	Pharmacist
18	Male	Pharmaceutical manufacturers Association of Ghana (PMAG)	Executive Secretary
19	Male	Pharmacy Council	Officer
20	Male	Kwame Nkrumah University of Science and Technology (KNUST)/ Pharmaceutical Society of Ghana	Lecturer

4.1 Draft Ghana AMR Policy

The review of the Antimicrobial policy for this study formed the background on which the results of this study are reported. The title of the policy document was Policy on Antimicrobial Use and Resistance.

The first draft of this policy was in 2015 but the finalized edition pending approval had a 2017 version date during the review.

The policy was seeking to address and contain the problem of antimicrobial resistance in Ghana took its bearings from the WHO global action plan on AMR, the Health Sector Medium term strategy, the Sustainable Development Goals (SDGs) and the necessity to achieve Universal Health Coverage through measures and interventions that are sustainable. The policy followed international discourse and adopted a One Health approach.

“It is expected that the use of antimicrobial agents in humans, plants and animal health would be optimized in the ‘one health’ approach through specific interventions in Responsible Use of Antimicrobials in humans, veterinary and aquaculture as well as in the environment and industry.”[Draft AMR Policy for Ghana, March 2017]

4.1.1 Aim of the Policy

The main aim of the policy was to improve and maintain health of humans, animals and plants in their environment and promote food security through rational use and access to good quality antimicrobials that are safe, affordable and also to prevent the spread of resistant infections and slow the emergence of microorganisms that are resistant using a “One-Health” approach.

The One Health Approach refers to adopting an integrated approach to combating antimicrobial resistance, focusing on interventions relating to antimicrobial use in humans, plants, veterinary and aquaculture.

The policy had five key overarching elements for which other themes were developed. These were as follows: i) Creation of AMR awareness and improvement of AMR understanding amongst the general public, using communication, education and training that is effective ii) To utilize research and surveillance to deepen knowledge and evidence base; iii) To reduce the incidence of infection through hygiene, sanitation and infection prevention and control measures that are effective as well as good agricultural and biosecurity practices. iv) Optimize the use of antimicrobial agents in human and animal health, aquaculture and crop production. v) Develop the economic case and create an enabling environment for sustainable investment that takes into account of the needs of Ghana, and increase investment in new medicines, diagnostic tools, vaccines and other interventions.

This followed international discourse and the propositions in the global action plan. (Chan, 2016).

4.1.2 Description of Key Elements of the Policy

The policy and National Action Plan (NAP) adopted the One-Health concept or approach that took into account use of antimicrobials in plants, animals and humans in their environment. It followed international discourse

Creation of AMR awareness and improvement of AMR understanding using communication, education and training that is effective was to map out communication and education through public education campaign on misuse of antimicrobials, training of health and veterinary professionals were also integral aspects of the policy. The policy also focused on inclusion of AMR in the curriculum for training health professionals, and in the curriculum of relevant educational institutions for training professionals in the Food and agricultural industries.

To utilize research and surveillance to deepen knowledge and evidence base

The policy and National Action Plan (NAP) also looked at improving knowledge, research and surveillance by setting up tools and systems to look at consumption of antimicrobials, establishment of surveillance centers and standardization of testing, Protocols and Standard Operating Procedures (SOPs) and data management of laboratory reports and surveillance data that would be shared regionally. The national action plan also stipulated implementation of national laboratory policy in all healthcare facilities. National laboratory policies would also be developed for the food, agriculture, fisheries and environmental sectors.

The third element was to reduce the incidence of infection through hygiene, sanitation and infection prevention and control measures that are effective as well as good agricultural and biosecurity practices

The policy and NAP captured measures for Infection Prevention and Control through Good hand washing practice, making potable water available in health facilities, proper waste disposal of effluent from hospitals and other institutions. Implementation of waste management policy for human health, as well as development of same in the food, agricultural and environmental sectors, promotion of vector control and vaccination in animal husbandry and aquaculture was also emphasized. Again, the NAP focused on promotion of management of the fertility of the soil, to produce resilient plants.

The fourth element was to optimize the use of antimicrobial agents in human and animal health, aquaculture and crop production

The policy and National Action Plan (NAP) also focused on promotion of rational use of antimicrobials at all levels and training, guidance and guidelines for practitioners. It also talked about the Institution of stewardship programs in hospitals, ability of district

hospitals to do culture and sensitivity, to inform prescription and dispensing of antimicrobials. Also the NAP captured restriction of advertisement of antimicrobials to animal, human and plant health professionals and scientific publications only. The NAP also captured institution of mechanisms to monitor antimicrobial use in fisheries, veterinary and agriculture. A treatment guideline for animal and plant health would be developed and implemented. The NAP also talked about establishment of standards for antimicrobial residue.

In the NAP, there was also a focus on determining and enforcing standards for biomedical waste and effluents from agricultural and animal production units and health facilities, as well as retrieval and disposal of unused antimicrobials are unwholesome from these facilities.

The policy then looked at the element to ‘Develop the economic case and create an enabling environment for sustainable investment’

The policy mainly took into account the needs of Ghana and focused on increasing investment in new medicines, diagnostic tools, vaccines and other interventions. It also focused on collaboration of the Ministry of Health, aquaculture development, Ministry of Fisheries and Ministry of Food and Agriculture to conduct research into the use of antimicrobials and antimicrobial resistance.

The NAP also looked at the creation of a platform that promotes information-sharing between industry, academia and policy.

Again, the policy captured improvement of manufacturing, supply and distribution of antimicrobial agents through sourcing of antimicrobials according to regulations,

determining of technical requirements and standards for local manufacturing companies by the Food and Drugs Authority, FDA and the Environmental protection Agency (EPA).

It also considered the establishment of a national bioequivalence center to support in the manufacture of generic antimicrobials that are of good quality. The policy captured promoting discovery of new antimicrobial agents, especially from herbal origin.

Strengthening and enforcement of regulations on antimicrobials was also key in the NAP.

Post Market surveillance of antimicrobials and Pharmacovigilance was also a key component of the NAP.

The draft antimicrobial resistance policy and NAP were developed by highly skilled technical people with proficiency in various sectors as described below.

4.2 Stakeholder Interests in Antimicrobial Resistance (AMR) Policy

The draft Antimicrobial resistance (AMR) policy and National Action Plan (NAP) were developed mainly by the Ministry of Health (MOH), Veterinary services department (VSD), Plant protection and Regulatory Services Division(PPRSD),Environmental Protection Agency(EPA), Faculty of Pharmacy, Kwame Nkrumah University of Science and Technology, World Health Organization, Country Office for Ghana, Department of Medical Microbiology, School of Biomedical & Allied Health Sciences, University of Ghana College of Health Sciences, Food and Drugs Authority (FDA), Pharmacy Council, Ghana National Drugs Programme, Ministry of Health, National Drug Information Resource Centre,

The policy is beneficial to all the actors and players and every human being, animal, or plant, which is likely to suffer from infection at one point in time and utilize antimicrobials, since the impact of antimicrobial resistance is universal as highlighted in

the key elements of the policy described. The ministries and regulatory agencies had a high interest in ensuring containment.

The funding of the AMR policy was provided largely by ReAct, and later supported by the Ghana Ministry of Health, the World Health Organisation (WHO) and the Food and Agricultural Organization (FAO)

ReAct, is a Swedish-based NGO that supports antimicrobial resistance (AMR) efforts across the globe and for them, the main benefit of funding the draft of the AMR policy was to achieve this goal.

The WHO on the other hand was interested in the health of populations across the world and ensuring Universal Health Coverage and AMR containment across the globe, and this has been a focus as far back as 2001.

The FAO and the OIE were interested in ensuring and protecting plant and animal health and AMR threatens that goal. These are United Nations (UN) agencies. The UN was interested in countries meeting the targets of the Sustainable Development Goals (SDGs) and AMR threatens the ability of countries to meet the SDGs, due to its impact on humans, plants, animals and the environment.

Together, the WHO, the FAO and the OIE formed a tripartite agreement to contain AMR, using a one-health approach and this was depicted in the policy and NAP.

4.3 Administrative and Technical Content of AMR Policy

Governance of the implementation of the National Action Plan (NAP) Antimicrobial resistance (AMR) activities at the national level would mainly be overseen by an inter-ministerial committee, comprising ministers of the Ministry of Health, Ministry of Food

and Agriculture, Ministry of Environment, Science, Technology and Innovation and the Ministry of Fisheries.

The AMR platform, made up of stakeholders from the human, animal, plant and environmental sectors, the technical working group and the AMR advocacy groups would form the base of the governance structure. This structure would be strengthened by creation of an AMR secretariat with coordinators who report to the chair of the AMR platform.

The NAP indicated that implementation would be at the district level by AMR committees at the districts and supervised by regional AMR committees.

Aspects of the policy, such as advocacy and education, were already being implemented through activities of the Civil Society Organizations (CSOs).

Much of the implementation phase of the policy will rely on existing structures, such as hospitals, laboratories, pharmacies, veterinaries, etc. and personnel, who work in these organization. Unfortunately, these existing facilities are ill-resourced to handle containment of AMR

Laboratory surveillance was a key component of the implementation phase that will require training and funding commitment. An AMR secretariat was to be set up, according to the national action plan, to oversee the coordination of the implementation of the policy.

The National Action plan was the microcosm of the policy and had a five-year lifespan, from 2017 to 2021, after which evaluation would be done once the AMR policy which is still pending is approval by parliament is approved.

4.4 Stakeholder Participation and Analysis

There was broad stakeholder consultation in the Antimicrobial resistance policy formulation. Stakeholder participation representations in meetings were however not very consistent, especially for the FDA, The pharmacy council, the Medical and dental practitioners, the Environmental protection agency. Representation of the various agencies was not limited to one person and in some cases, representation of agencies varied per meetings. Stakeholder participation is aptly depicted in Table 4 below.



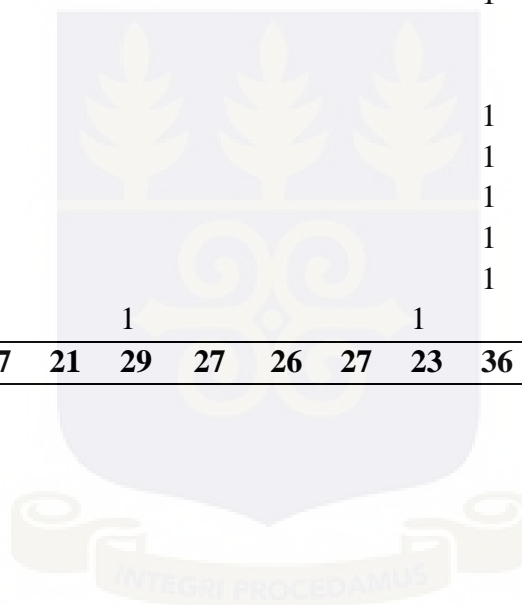
Table 4- Stakeholder Participation in AMR Platform Meetings

Institution/Meeting	Total Meeting Representation										Given the actors interests and the likely impact of the policy on the actor, what level of concern	Given the actors interests (what level of impact were policy likely to have had on actor?) (high,	Given the actor's source and level of power, what level of influence was the actor likely to have had on the policy process?	
	15/02/2011	18/08/2011	08/02/2012	10/05/2012	23/04/2013	11/07/2013	02/04/2014	10/07/2014	21/10/2014	13/04/2017				
GHS	1	1		2	3	2		2	1	4	16	High	High	High
UGMS/ADMER	2	2	1	2	2	2	2	1	2	4	20	Low	High	Medium
Central Lab					1	1					2	High	low	low
GNDP	3	2		1	2	2	3	1	2	3	19	High	High	High
MOH	1	1	1	1	2	2	1	3	3	7	22	High	High	High
CHS, Kumasi	1	1	1	1	1	1	1	2	1		10	Low	High	High
VSD			2	1	1	1	1	1	1	2	10	High	High	low
FDA	1	1					1				3	High	low	low
W.H.O		1	1	1	1	1	1			1	7	High	High	High
Police Hospital		1	1	1	1		1	1		1	7	High	Medium	low
WHO-CC center for Pharmacovigilance				1							1	Low	low	low
UGMS/KBTH	1			1	1	1		1			5	Low	Medium	low
GRNA			1	1	1	1	1	1	1		7	Low	Medium	low

CSR				1	1	1				3	Low	low	low
ICD	1	1		1			1	1		5	Low	low	low
MOH/GHS	1	1		3	2					7	High	Medium	High
P&S/MoH					1					1	High	low	low
NDIRC	1	1	1	1	2	2	2	2	2	14	High	High	Medium
PMAG		1		1		1	1		1	5	High	low	low
ReAct	2									2	Low	High	High
MoH Finance					2					2	High	low	High
Finance	2	0	0	0	2	0	0	0	0	4		low	High
FAO									2	2	High	High	High
Kintampo Health Research center	2		2	2		1	1	2	2	12	Low	low	low
Pharmacy unit (HQ)						1				1		low	
INDEPTH NETWORK	3		1	1						5	low	low	low
College of Physicians and surgeons	1									1	low	low	low
CWSA			1			1				2	High	low	low
OCP		1								1	low	low	low
Coalition of NGOs			1	1		1	1	2	1	7	Medium	Medium	low
PSGH			1			1			1	3	High	Medium	low
LAPAG			1	1	1	1	1	1	2	8	High	Medium	low
Center For Science and Health Communication			1	1				2		4	Medium	low	low
TTH							1	1		2	Medium	low	low
CHATFRAM						1	2			3	Medium	low	low
GCNH								1		1			low

Table 4-continued

									3	3	High	High	High		
MTT MacDonald															
TMPC								1	1		2	High	low	low	
Ghana Atomic Energy Commission (BNARI)										1	1	low	low	low	
Livestock Breeders And Traders Association										1	1	low	low	low	
GSA-Codex										1	1	low	low	low	
HTTG										1	1	low	low	low	
MOFAD										1	1	High	low	low	
Private Veterinarian										1	1	low	low	low	
GCNH										1	1	low	low		
Pharmacy Council								1		1		2	High	low	low
TOTAL	23	15	17	21	29	27	26	27	23	36	244				



4.4.1 Composition of the Technical Task Team Responsible for the AMR Policy Development

Members of the technical task team contributed to specific sections of the policy, before it was merged as one document for general contributions. The contributions centered on the five key elements of the draft policy, and as also stipulated in the global action plan. There was one person from WHO represented on the technical task team to contribute on regional or international issues. The membership of the technical task team is represented in table 5 below.

Table 5 Antimicrobial Resistance Technical Task Team and Their Contribution

Contribution	Committee Members
Current situation on antibiotic use and resistance in Ghana	Lecturer, School of Pharmacy, Kwame Nkrumah University of Science and Technology (KNUST) Professor on Microbiology, University of Ghana
Rational use of antibiotics Office of the Chief	Director of Pharmaceutical Services
Hospital infection prevention and control	President, Society for Private Medical and Dental Practitioners Medical Doctor, Ghana Health Service
Laboratory diagnostics and protocol requirements	Lecturer, School of Pharmacy, Kwame Nkrumah University of Science and Technology (KNUST)
National surveillance system for antibiotics	Researcher, Kintampo Health Research Institute Director for Pharmaceutical Services Professor in Microbiology, University of Ghana
Antibiotic manufacturing, distribution and storage Regulation and Enforcement	Head of Pharmacovigilance Unit, FDA Representative of Traditional Medicines Council
Use of Antimicrobials in Veterinary and agriculture	Director for Public Health, Veterinary Services Department
Information Management	1 Ghana National Drugs Program (GNDP)
Regional Issues	WHO Representative on Essential Medicines

4.5 Resources for Implementation

Funding of the implementation phase of the policy was to come predominantly from donors. The National Action Plan (NAP) budget for implementation was 21 million dollars. A proposal had been presented to the Fleming Fund for funding of the surveillance aspect of the NAP. The proposed amount from the Fleming Fund was an initial 1.8million pounds and additional 500,000 pounds for the inception phase of the project, for eighteen (18) months. Depending on the burning rate and how the implementation proceeds, more funds could be sourced from the Fleming Fund. Actions on resource mobilization were however not captured in the NAP this is highlighted in the quotation below

“A plan for resource mobilization was not done. A discussion with the World Bank team was slated however, for end of July, to discuss the possibility of the World Bank funding antimicrobial resistance activities in Ghana. “[Personal Communication 19/07/2017]

Technical support however would be provided by the World Health organization, WHO, the Food and Agricultural Organization FAO and the World Organization on Animal Health (OIE).

4.6 Factors that Necessitated the AMR Policy Formulation in Ghana.

Ghana had had in place certain guidelines and protocols which had implicit repercussions for containing Antimicrobial Resistance (AMR) such as an infection prevention and control policy, guideline on hand washing , a programme in place on rational use of medicines , including antibiotics , antibiotics policy in hospitals and policy on integrated pest management system in the agricultural sector. There was however no specific policy on antimicrobial resistance and existing policies were either not coordinated or implemented appropriately. Hence, the need for an antimicrobial policy.

Thus the AMR policy-formulation process in Ghana was started on the back of a myriad of factors. These factors were identified as both local/country factors and international factors.

4.6.1 Country Factors

The country factors that necessitated the AMR policy formulation included the direct incidence of *Methicillin resistant staphylococcus aureus* (MRSA) causing the Neonatal Intensive Care Unit (NICU) of one of the nation's teaching hospitals, Korle Bu Teaching Hospital (KBTH), to be closed. A similar incidence occurred in a district hospital in the regional capital. Country Awareness of the AMR problem began to increase as a result of these and other resistance-related issues such as change in policy in the anti-malarial treatment in Ghana due to parasitic resistance to existing treatment.

Also, the indiscriminate and irrational access and use of antibiotics became so glaring to the leaders of the healthcare industry and the awareness and acknowledgement of this as a problem necessitated the AMR policy in Ghana.

"I think it's the situation. We had of resistance strains in Ghana and we needed to do something about it. It was getting worse. The baseline surveillance was done during the policy formulation process and we really compared what was done then to what had been done 10-years earlier and the difference was very clear. The situation was getting worse and so we needed to do something about it. We had had a program in place on rational use of medicines , of which antimicrobials was a part of and we realized that as long as health practitioners were not engaged differently, prescribing, and use of antimicrobials was uncontrolled . There was a need for a specific policy direction for antimicrobials since antimicrobials were a peculiar set of medicines." [Committee member, 15/06/2017]

Then again, there had been an ongoing research program known as the ADMER project that was churning out a lot of evidence of antimicrobial resistance in the nation's hospitals. These research findings were shared with key players of the healthcare industry in Ghana

and that made it possible to move research into policy. On what necessitated the AMR policy formulation in Ghana, this is what respondents had to say:

“The problem of AMR and the fact that if you go to some of the major hospitals very simple infections are becoming difficult to manage and two three antibiotics are being used and still not yielding results and there was still the problem of indiscriminate access and use, which was also one of the determinants of AMR. It had become clear that the problem was becoming a very serious public health issue and Ghana was not the only country that had this problem but the problem was becoming real and getting worsened, so definitely had to be done to address the issue and as I said, all along, we had some data from the ADMER group, which was giving us insight about how this problem was becoming and it became much clearer when we looked at the knowledge-base of people who are supposed to be health professionals. We actually identified significant gaps.” [Committee Member, 19/06/2017]

“It was realised that AMR was a big issue, not only at the local level but it was being discussed at the global level also. The discussions going down globally trickle down to us. We realised that there was a problem and again, in our part of the world, we don’t do very well in research and development. We benefit from what happens in other jurisdiction and we’ve had issues of resistance here. We had MRSA infection in Ghana and a whole paediatrics ward had to be closed down.” [Committee Member, 14 /06/2017]

“Change in policy in treatment of antimalarial was a big issue and everyone got to know. Apart from that, there were a few issues with antibiotics, for instance there was an instance where Korle-Bu pediatric ward had to close down due to resistance” [Committee Member, 15/06/2017]

4.6.2 International Factors

Quite apart from country factors that necessitated the immediate formation of the AMR platform and initiation of the policy formulation process, there were other external factors, mainly international discourse or exposure to the subject matter by key players of the Ministry of Health in Ghana.

Ghana is a member state of the Food and Agricultural Organization of the United Nations (FAO), World Health Organization (WHO) and World Organization for Animal Health (OIE) and signs on to protocols from these organizations, and would naturally implement

protocol commitments. Whereas no nation can be forced to implement commitments and there are no overt sanctions for not complying with resolutions, there are undertone diplomacies. Antimicrobial resistance had been a topical issue for these organizations for some time now and Ghana being a member state was part of efforts towards containment of the phenomena. For instance, in 2014, Ghana made a commitment at the WHO ministerial meeting on AMR in the Hague, to host a conference themed ‘Who is winning the war against antibiotic resistance’ as part of its commitment towards the global action plan. (Ministerial meeting in the Hague, 2014)

‘No nation can be forced to be part of anything, if it will be detrimental to it. Ghana is a sovereign nation. And once Ghana decides to do something, it’s because we want to and not because we are being forced to but Ghana has signed on to so many international protocols and if we have signed unto them, it means that we are agreeing to be part of it.’ [Committee member, 15/06/2017]

“Ghana belongs to a number of international organizations and signs on to protocols, treaties etc. by these organizations. AMR has been a concern to many people, particularly FAO, WHO and OIE and these are agencies that Ghana as a country forms a part of. Internationals organizations work with country counterparts and Ghana being a member of these organizations decided to commit to the AMR policy.” [Committee member, 16/06/2017]

“Because for example for the WHO, countries are member state of the WHO. So if you go on the World Assembly and you sign on a resolution, you are supposed to implement it in your country. Because of those global actions, countries are expected to do something on it. You go and sign it and you come back, you have to implement” [Committee member, 23/06/2017]

Also, international interactions and associations led to a lot of subject matter exposure to the problem of antimicrobial resistance and its repercussions by key members of the Ministry of Health in Ghana. For instance, the then programme manager of the Ghana National Drugs Programme (GNDP), who later became the director of Pharmaceutical services and chairperson for the antimicrobial working group in Ghana, had been involved in the drafting of a working paper for drug resistance. Also, she had an interaction with a

professor of microbiology and founder of ReAct, a Swedish-based NGO working towards AMR efforts across the globe. ReAct later came on board to support the AMR policy formulation process in Ghana and that really propelled the process.

“It was also what was happening globally. There is a professor in Sweden. He has been a strong AMR advocate. A key officer of the Ghana Ministry of Health happened to have rubbed shoulders with him the made the country get along a certain path but the evidence was also very important.” [Committee Member 15/06/2017]

It was clear from the international interactions and discourse that AMR was an issue and country efforts were required for containment but the disparity between the international discourse, as well as the drive from the international community was instrumental in setting out the course of the AMR policy-formulation in Ghana. Whilst the international discourse centered on infection prevention and control, rational medicines use and raising awareness on AMR and the need to use antimicrobials responsibly as the situation in Ghana was different, characterized by indiscriminate access and use of antimicrobials and a low awareness of the problem of AMR and its implications, even amongst health workers.

4.7 Ghana Antimicrobial Resistance (AMR) Policy Formulation and Decision Making Process

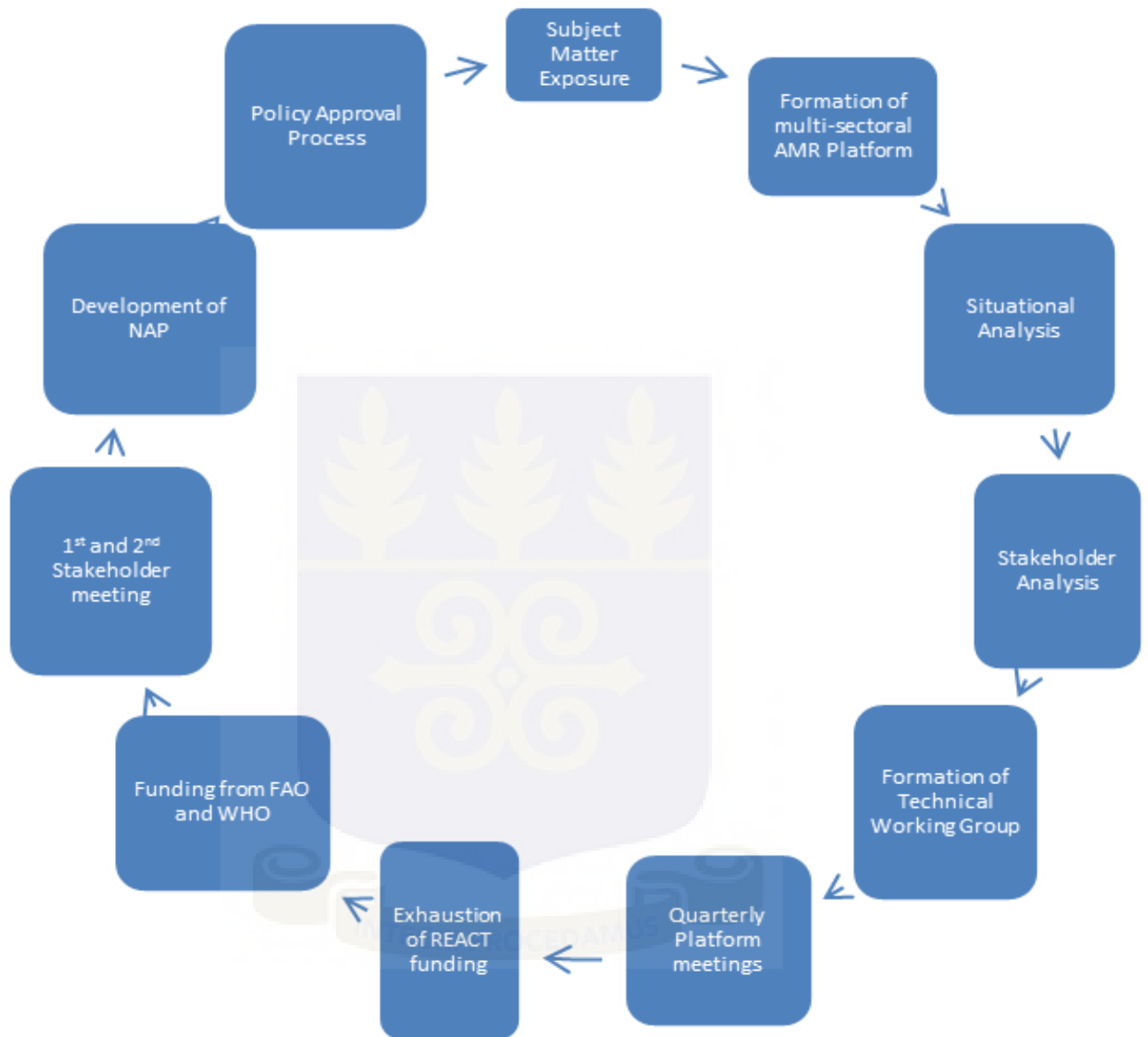
The AMR policy formulation and decision-making process comprised AMR subject-matter exposure, communication and mobilization of stakeholders, commissioning of studies, formation of a technical working group and quarterly platform meetings. The policy decisions were made at the quarterly platform meetings based on information from international meetings attended by members, commissioned studies, and review of documents and information from the field, based on activities of Civil Society

Organizations (CSOs). These were then followed by stakeholder engagement and finally, policy approval.

Figure 3.0 Antimicrobial resistance policy formulation and decision-making process in Ghana.



Figure 3.1 Antimicrobial resistance policy formulation and decision-making process in Ghana.



The Ghana antimicrobial policy formulation process was developed in the following sequence.

4.7.1 Subject-Matter Exposure

The Ghana AMR policy formulation process began in 2011 on the backdrop of subject-matter exposure on the problem of AMR and the urgent need for measures of AMR containment by individual countries whose efforts will then be coordinated globally. There was participation of the AMR chairperson, the then GNDP Programme manager and deputy director for pharmaceutical services in drafting of working paper on drug resistance, commissioned by the global Health Development Council in the US. Also, participation of the same person in an Uppsala meeting on AMR set the ball rolling as she returned and had a meeting with two others to commence AMR containment work in Ghana. The ministerial 1 AMR meeting in the Hague in 2014 also helped with subject-matter exposure although the Ghana policy-formulation process was already underway by then. Also, the 71st UN general Assembly in 2016 is a forum where there was further AMR subject matter exposure, though the draft Ghana AMR policy was already concluded by then.

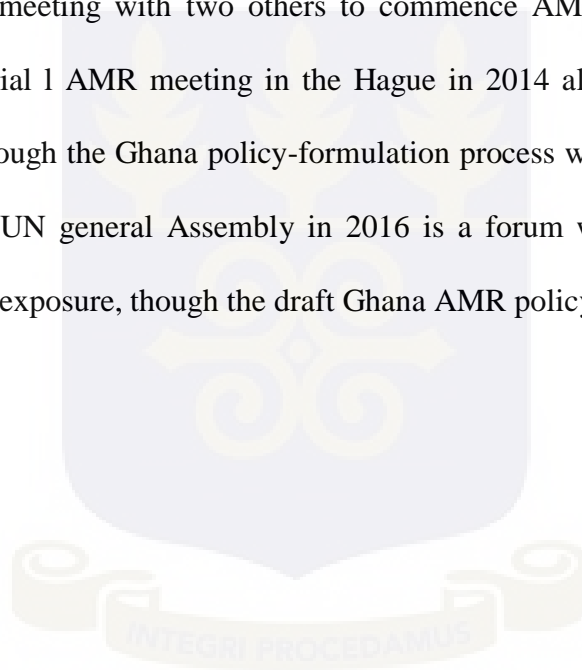


Figure 4.0 Antimicrobial resistance policy formulation and decision-making process in Ghana



Generally, subject matter exposure came in the form of meetings of the United Nations (UN) , World Health Organization (WHO) , World Health Assembly(WA) Food and Agricultural Organization (FAO) and World Organization on Animal Health (OIE)

“I was involved with deputy director for pharmaceutical services. Originally, we were part of this REACT group. REACT is an NGO in Sweden.

And they contacted the deputy director for pharmaceutical services that they wanted to work with Ghana on anti-microbial resistance. REACT is a Sweden group. In fact they started the whole anti-microbial resistance movement” [Committee Member, 23/06/2017]

I was selected by the global Health Development Council in the US to be a member of their working group to draft a working paper for drug resistance and I did that thereafter I also participated in an antibiotic meeting in Uppsala and I realised that it is not a Ghana problem and that resistance does not really know any barrier. From that meeting in Uppsala, I met with two others and we decided that we had to do something in Ghana. We began the policy process [Committee member, 21/06/2017]

After these meetings, there was communication and mobilization of stakeholders from different backgrounds including government, civil society, academia, pharmaceutical industry etc. Meanwhile, meetings as GNDP management to conceptualize what was to be achieved and how to contain antimicrobial resistance in Ghana up until 2011. During that period, there was an agreement between the MOH and ReAct, a Swedish-based NGO that supported AMR policy efforts across the globe, for ReAct to fund the Ghana AMR policy formulation.

“As we began the process we tried to bring together as many stakeholders, who somehow somehow were involved in AMR. Not necessarily antibiotics, but antimicrobials and that would include ACTs and other antimicrobials, rather than simply antibiotics. So we spoke with the universities, and they were willing to be part. We spoke with INDEPTH, who are a research organisation and they were willing to be part” [Committee member, 23/06/2017]

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4.7.2 Formation of multi-sectoral AMR Platform

A multi-sectoral AMR platform was formed with stakeholders from College of Health Sciences, Kwame Nkrumah University of Science and Technology (KNUST) ,ReAct, Kintampo Health Research Centre, Ministry of Health (MOH) INDEPTH NETWORK, University of Ghana Medical School (UGMS) Department of Microbiology, National Drug Research and Information Center (NDRIC), Food and Drugs Authority (FDA), Ghana National Drugs Programme (GNDP), The initial group did an assessment of previous studies on AMR in Ghana and a seven-member delegation led by the minister

and director for pharmaceutical services was selected from the platform, to participate in an AMR conference held in New Dehli, India in October 2011. The theme of the conference was ‘Balancing Treatment Access and Antibiotic Resistance’, to increase the subject matter base on AMR. [Committee Meeting Minutes, 08/02/2012] Three members of the working group, namely, the director for pharmaceutical services, the WHO representative and an officer from the MOH participated in a ReAct-Civil Society Organization (CSO) meeting Penang, Malaysia from the 17-18th of February 2012, and a collaborative meeting at ReAct in Uppsala, Sweden from the 21st – 22nd of February 2012.

“At the India meeting, which was a big platform where the whole world was discussing the issue and there a lot of thoughts and insights. This was in 2011. So this whole thing started around 2011, when we started the first stakeholder meeting, some of us were selected for the India meeting and when we came back we sort of worked towards the concept note and 2012 , the ministerial task-team was formed” [Committee Member, 19/06/2017]

‘So we did that and we began our multi stakeholder meetings with support from REACT and the MOH. The MOH also supported because although it was something new, they felt it was a priority issue [Committee member, 23/06/2017]

4.7.3 Commissioning of further studies

After assessment of existing studies, further studies were commissioned to have a clearer picture of what the country AMR situation was. A sub group made up of a lecturer at the Kwame Nkrumah University of Science and Technology, KNUST, two officers one from the Ministry of Health and another from Ghana Health Service was set up to do a desk review of the drivers of resistance. [Committee Meeting Minutes 18/08/2011]

Coordinators were nominated to monitor commissioned studies and subsequent dissemination of progress to various stakeholders. A nationwide surveillance was also started to gather information on resistance patterns from the various laboratories in Ghana. The opportunity was taken during the process to standardize the laboratories and train the laboratory staff.

A memorandum of understanding was signed between the Ministry of Health (MoH) and Microbiology Department of the University of Ghana Medical School (UGMS) to commence national laboratory surveillance in May 2014 for a period of 6 months.

[Meeting Minutes]

By 10th July, 2014, funds had been released for commissioned studies and training of data collectors had been done. [Meeting Minutes 10/07/2014]

Community engagement was also done to further identify gaps in knowledge and practice and address them.

“Part of the funds was specifically given to the microbiology department at Korle-Bu to do a baseline research. They did a nationwide surveillance. They had done a baseline survey 10 years earlier but this was another baseline study, to show the kind of resistant strains we had in Ghana. It was not just a base line study that was done. They utilized that opportunity to do standardization of the laboratories and also to train the staff. ‘ [Committee Member, 15/06/2017]

4.7.4 Situational Analysis of AMR state in Ghana

A stakeholder analysis was done by an officer of the Ministry of Health, who was also a member of the platform, and shared at the platform meeting on 2nd April, 2014 [Committee Meeting Minutes 02/04/2014] A situational analysis was also done by the technical tack team, headed by two professors, to provide information on the AMR situation in Ghana between July and August of 2014 [Committee Meeting, 10/07/2014].

By October, 2014, the situational analysis had been done and the main issues identified were widespread indiscriminate use of antibiotics, absence of monitoring mechanisms absence of veterinary standard treatment protocols and a lack of appropriate legislature in veterinary practice [Committee Meeting, 21/10/2014] The situational analysis showed that although surveillance data was important in the tracking of changes in microbes, support in outbreak investigations, clinical interventions and guide policies, there was the lack of an antimicrobial surveillance mechanism. [Draft NAP, 2017-2021]

“The technical task team was led by two professors from the University of Ghana Medical School They came out with a beautiful situational analysis and we came out with what should be the various portions of the policy. The situational analysis identified the gaps and so it was easier for us” [Committee Member, 23/06/2017].

“Antibiotic Drug use, Monitoring and Evaluation of Resistance (ADMER) played a key role also. They had commissioned a lot of studies. PHD, Post doc, etc., and so we had a lot of information from the work they had already done and so based on that, with support from the Swedish agency, we were also able to commission other studies. We did a nationwide surveillance study to try and understand the antimicrobial susceptibility /resistance pattern across the country. So we had a bit of idea about the resistance pattern. That work was done with support from ADMER by the University of Ghana, but that was in 2004 or so. The Danish partners were supporting ADMER” [committee member, 19/06/2017]

4.7.5 Formation of Technical Working Group for AMR in Ghana

By 8th February, 2012, a draft framework of the policy document had been put together by a section of the committee members, touching mainly quality control and regulation [Committee Meeting Minutes 08/02/2012] A technical working group was formed on 7th November, 2013, which reviewed existing literature and identified gaps. They also reviewed International Best practices and recommendations. The working group was further broken down into smaller working groups and these working groups formulated the various policy statements which eventually were assembled to give a draft policy as reported below.

“...then the technical task force/team was formed to come up with the draft policy. The evidence generated from the various commissioned studies plus the work from ADMER, was all used to come up with the policy statements. “[Committee Member 19/06/2017]

4.7.6 Quarterly Platform meetings on AMR policies

Meanwhile, quarterly platform meetings were held from February 2011 till date, although at some point, the meetings were not very regular and these were characterized by Presentations by the ADMER group on Research findings, Presentations by Participants of International meetings on AMR, knowledge-sharing and policy decision making to further develop the policy.

By the end of 2015, the first draft policy had been concluded and the ReAct Project had officially ended and so the funding from ReAct was. At that point, the World Health Organisation (WHO) and the Food and Agricultural Organization (FAO) came in to provide some funds to move the process forward through funding of the AMR platform meetings and other correspondence relating to the development of the AMR policy

4.7.7 Stakeholder Meetings to share the draft AMR policy

A first stakeholder meeting was held in 2015 to share the draft policy document with the hope of progressing the document for policy approval in Ghana afterwards. This was however not to be, as there were calls from the FAO within the same year, for the inclusion of the one-health concept in the policy. Even though the Environmental Protection Agency (EPA), the Veterinary Services Division (VSD) and other stakeholders in the non-human health sector had been involved in the process from the beginning, there was very little contribution to the policy due to the lack of data in those areas. The initial draft policy therefore, was more oriented towards humans and had very little information in these areas. The FAO felt that the policy was geared more towards human health and

there was the need for the inclusion of other aspects on the environment, agriculture, fisheries and veterinary. Thus, there were calls for an expansion of the stakeholder base.

In 2015 also, there was the development of the WHO Global Action Plan on AMR and member countries were required to adopt that in the context of their country circumstances, to develop their policies and National Action Plans (NAPs.)

The above factors led to subsequent reformulation of the policy to capture the stakeholder inputs.

A second stakeholder meeting was held in 2016 to present the finalized draft capturing the comments from stakeholders from the first stakeholder meeting.

4.7.8 Policy Approval Process

After acceptance of the policy content and format by the various stakeholders in 2016, the policy approval process began with the drafting of a cabinet memo in 2016.

“...after which we have a draft policy and then go through the required policy approval processes. That involves getting a cabinet memo. We need to write the policy in a memo or in a particular format that cabinet works with. As part of the output, there will have to be an implementation plan that with costed and also captures M&E.” [Committee Member, 19/06/2017]

This was followed by political engagement, including several presentations to the parliamentary select committee, during which parliamentary AMR ambassadors were obtained. Approval of the document by cabinet was estimated to occur by November of 2016 but this did not happen due to delays from parliament given the fact that 2016 was an election year and hence the parliamentarians were caught up in electoral campaigns. There was however a change of government in Ghana in December 2016 which led to a change in cabinet representation and hence there was the need to restart the AMR policy approval process.

Representation of draft policy for ministerial approval occurred. Due to the one-health approach however, the ministerial review involved ministers from four ministries, namely, Ministry of Health, Ministry of Food and agriculture, Ministry of fisheries, Ministry of Environment Science, Technology and Innovation (MERSTI)

“It was sent to the last cabinet before in 2015 and was to be looked at and passed but that was not done. 2016, being an election year, again it affected the approval with cabinet and now there is a new cabinet in place and the whole process has to be started all over again with the ministers approval before presentation to the new cabinet.

The ministries involved are the ministry of Health, Ministry of Food and agriculture, Ministry of fisheries, MERSTI (Ministry of Environment science, technology and innovation).” [Committee Member, 15/06/2017]

A small group was formed within the platform to work on the inputs from the various sector ministers before presentation of the document to cabinet by August 2017.

The next steps in the policy process would be cabinet approval, launch of the policy and NAP, implementation, monitoring and evaluation as well as mid-term and end of term policy-evaluation

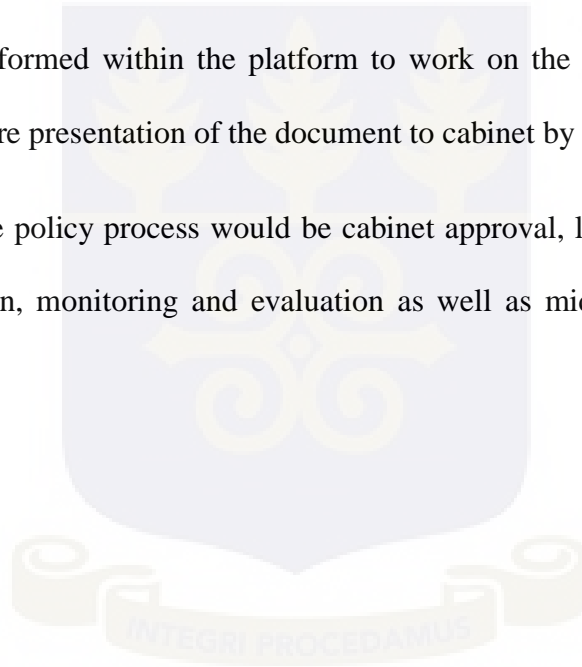


Figure 5.0 Next steps of the Ghana AMR policy process



“For every policy, after implementation you do evaluation. After evaluation you look at what should change. What should be improved? What should be maintained? There is an M&E that will have a mid-term evaluation and also end of term evaluation” [Committee Member, 21/06/2017].

4.8 Elements of Country AMR and International AMR Discourse.

The results of this study revealed that international and country –level AMR discourse were quite similar, very little differences however were observed. The elements were similar in the approach, country commitments and subject matter.

4.8.1 Country Commitments

International discourse on AMR centered around the fact that countries should have a national action plan, ensure Implementation of commitments and engage in advocacy at

all levels(WHO, 2016b) (*Ministerial AMR meeting in The Hague, June 2014*)(WHO, 2016)(Shallcross & Davies, 2014).

Country level AMR discourse also exhibited a commitment to develop a national action plan on AMR and an AMR policy document and advocacy at all levels. Ghana is currently in the process of developing an AMR policy and a NAP for AMR.

4.8.2 Approach to AMR containment

The One Health Concept and multi-sector collaboration

The One-Health Concept came up strongly as an integral part of both country-level and international AMR discourse. The one-health concept hinges on the fact that no single method or sector can solely curb AMR. A multi-pronged, multi-sectorial approach to curbing antimicrobial resistance which involves efforts in the human health, agriculture and environmental sectors was required(Jasovský, Littmann, Zorzet, & Cars, 2016).

At the 71st session of United Nations (UN) General Assembly Meeting, Heads of states of member countries made a commitment to tackle AMR from the root cause, using a One-Health approach. WHO, FAO and OIE and development banks were recommended to synchronize their activities and planning actions. (UN general Assembly meeting, September 2016). There was a multi-sectoral collaboration (Tripartite collaboration) agreed by the World Health Organization (WHO), the Food and Agricultural Organization (FAO) and World Organization on Animal Health OIE(Chan, 2015).

The FAO action plan on AMR and the WHO action plan on AMR also focused on the one-health concept.

Locally, the AMR platform comprised stakeholders from the plant, animal-health, human health and environmental sectors and the draft AMR policy as well as the draft National

Action Plan (NAP) captured aspects of AMR containment in the human, animal and environmental sectors.

“The key thing in the policy is about the concept of one-health. One-health tries to bring seamless interventions in human health, animal health and perhaps all other sections where antibiotic use is important. So fisheries and plant etc. That is the key content of the policy but to break it down, it follows international recommendation’ [Committee Member, 19/06/2017].

The 2015 WHA resolution talks about contextualization and adaptation of the Global Action Plan (GAP) by countries.

A bottom-up approach was adopted in the development of the global action plan. Web-based consultation with 130 inputs from member states, NGOs and private sector entities were a key aspect of the development of the GAP(Chan, 2015).

Similarly, a bottom-up approach was adopted in the development of the AMR policy, where multi stakeholders were involved in the policy formulation process right from the beginning.

“Prior to country-level action, there had been a lot of discourse and discussions at the international level and these discussions didn’t happen out of the blue. It a bottom up approach and so countries were involved in the international discussions which happened earlier. So at the point when countries had to also make policies they could frame in some of the things that could happen at the international level.”[Committee Member, 19/06/2017]

The Global Laboratory Antimicrobial Surveillance System (GLASS), and the ATLAS are surveillance tools by the WHO and FAO respectively, for AMR laboratory surveillance which form part of international AMR discourse. These were however yet to be fully adopted by Ghana.

Political Commitment was also a key element of AMR discourse(Jasovský et al., 2016)

4.8.3 Subject Matter

The subject matter of international Antimicrobial resistance (AMR) discourse centered on countries Re-affirming commitment to develop National Action Plans (NAPs), stronger monitoring systems for drug resistant infections, awareness improvement, improvement on regulation on antimicrobials, promotion on best practices and the need for countries to use less-expensive mediums or interventions that are already in existence to achieve infection prevention in Humans and animals. For example, Immunization, sanitation and potable etc., as well as new incentives for industry to invest in research and develop new medicines and rapid diagnostic tests that are affordable and efficacious to take the place of existing ones that are becoming ineffective (Thomson, 2016) (WHO, 2016a) and (Chan, 2015).

The Food and Agricultural Organization of the United Nations (FAO) AMR action plan also focused on supporting WHO Global Action plan in highlighting the need to adopt a One Health approach, promote AMR knowledge and associated threats, build capacity to monitor AMR and AMU (antimicrobial use), as well as AMR surveillance in food and agriculture, strengthen governance related to AMU and AMR in food and agriculture, promote good practices in systems relating to food and agriculture and the rational use of antimicrobials (FAO, 2016)

At the country level the discussion followed international discourse with focus on advocacy, infection prevention, promotion of rational use of antimicrobials at all levels, pushing for research on antimicrobials to inform practice ,exploring herbal medicines with antimicrobial activity, manufacturing, distribution, regulation and disposal of antibiotics, communication and education, training and surveillance.

“We always have the one-health concept in mind. For Ghana, even though in our policy and action plan, we are thinking about development of new antibiotics, it’s a very futuristic priority for us since we currently do not have the capacity for that. Our concentration therefore is going to be on prevention of infection, advocacy, and rational use of antimicrobials.” [Committee Member, 15/06/2017]

4.9 Ways International Discourse and International Players Influenced Ghana AMR Policy Formulation

The inclusion of One Health concept into the antimicrobial resistance (AMR) policy and National Action Plan (NAP) was an example of how international discourse had influenced the AMR policy formulation content. The synchronization of the NAP and the AMR policy with the Global Action Plan (GAP), was another example. The format of the policy was similar to that of the GAP with similar objectives and capturing the five-elements captured in the GAP. The initial draft policy of the Ghana policy was concluded late 2014, prior to the release of the GAP in 2015. Upon the release of the GAP however, there was a call from World Health Organization (WHO) for countries to align policies and NAP with the GAP. By this time, Ghana already had a fully developed draft policy and amendment had to be done to capture the elements under the aspects captured by the GAP. Inclusion of aspects on veterinary, animal health and veterinary was called for, when the Food and Agricultural Organization (FAO) came on board in 2016. Again, there had to be amendment in the policy and NAP to capture this, further slowing down the process.

“We finished around 2015 and so it could have been passed around 2015 but that was the time that FAO also came on board and were pointing out to us some things that had to be included” [Committee member, 15/06/2017]

“They also came in to provide some support because at that point, the sponsorship from REACT had been exhausted. They came in to strengthen the animal side of the antimicrobial resistance policy. That was the reason why the policy could not be launched, because it had been brought back to include the one-health concept. At that time, WHO was also working along that tangent, that the AMR policy should be developed based on the one-health concept.” [Committee Member, 19/06/2017]

Formulation of concept note and platform work was informed by the AMR meeting in India in 2012. Aspects of the WHO GLASS system were captured under the NAP. The methodology for global consumption used in the NAP, was the Defined Daily Dose (DDD). The Integrated Pest Management system of the Plant Protection and Regulatory Services Directorate (PPRSD) was also a global concept. Presentations were made frequently by the WHO contact person, FAO focal person, the OIE focal person for Ghana, as well as people who had participated in international meetings and this fed directly into the content of the policy and the NAP.

“When we started developing the policy, it was our own policy but then the global action plan came in and we had a lot of meetings, internationally in our African Region, we.... So I had to push that we had to follow the global action plan. In some of the documents you would see that aligned with the global action plan” [Committee Member, 23/06/2017]

“The evidence generated from the various commissioned studies plus the work from ADMER, was all used to come up with the policy statements. Which looked at specific areas. Again, we also had some ideas from the WHO action plan and so we also got some ideas from that” [Committee Member 19/06/2017]

“At a point, it was realized that animal production, use of PPE were not captured in the policy formulation and to amplify the one-health approach, the standards authority, VSD, and FDA came on board. The FAO came on board in 2016 and requested that agencies like the standards authority, VSD, and the FDA be robed in to capture the regulatory perspective and assure one-health approach.” [Committee Member, 14/06/2017]

4.10 Factors Affecting Translation of International Discourse into Local Policies

Though international and country-level antimicrobial resistances (AMR) discourse were quite similar, not all international discourse translated into local policy realities. Specific factors that were identified as facilitating the translation of international AMR discourse into local policies included resources, the problem or situation, data documentation:

Resources such as funding, credible man-power and implementation capacity were key in the AMR translation of international discourse into local policy realities.

“Translating the policies is not the real problem. Challenges relating to implementation have to do with resources, credible man power, and financial muscle of the country, management in terms of ensuring that the right people are handling the right projects and are at the right place.” [Committee Member 14/06/2017]

Acknowledgement and or understanding as well as what the focus and objective of the international discourse was important for aiding in the ability to contextualize interventions to country situations, given all factors as well as socio-cultural factors

“The country first needs to accept that the problem being discussed on the international stage is a problem.” [Committee Member, 14/06/2017]

“Because of the one-health system, our challenges are purely about development. For instance, illiteracy or our level of understanding, lack of proper records, lack of proper data. So our challenge as a developing country is the problem. Lack of full participation of the focal person, resulting in a loss of track of discussions” [Committee Member, 20/06/2017]

Furthermore factors such as understanding *International Conference resolutions* such as the WHA resolution of 2015, Uppsala meeting resolutions of 2012, 71st UN general assembly of 2016 aided translation

Also, the status of the country’s health system and its capacity to absorb the interventions being proposed was a facilitating factor in translating the international discourse on AMR

“Willingness of the community, health systems, Inability to enforce regulations, behaviour/ culture; we tend to overly respect people in authority and so brush aside the law where they are concerned.” [Committee Member, 14/06/2017]

Other factors included commitment from government and leadership. Leadership in setting the process in motion and ability to get the buy-in of various stakeholders and carry them along in the process was key.

“The director for Pharmaceutical Services has been very instrumental; she is a networking person, a people’s person. She would coax you, she would. She has really

done well. It is her passion and we have been pushing from behind with WHO support. One of the things that can help you sustain is having a champion and she has been a good and marvelous champion. And that has brought us this far” [Committee Member, 23/06/2017]

“.....The leadership. The ability to get people to understand where you want to go and ability to maintain the team. Those are our success factors.” [Committee Member, 21/06/2017]

The enforcement of regulations was also key. Good policies are those that are best implemented. Ghana’s 2014 Aide memoir with the MOH had a condition to have in place and AMR policy.

“The ministry has a Pact with the donor community and every year, you sign a pact with the donor community, which we call aide memoir and this spells out key actions that must happen and in 2014, one of the key actions was to have a policy framework for AMR and so with that the donor community supported with some funds and that is what has pushed us to this stage” [Committee Member, 21/06/2017]

Having existing policies also facilitated translation of the international discourse.

“Also, locally, the response from the farmers and other stakeholders, informs our decisions on a very steeper side, in terms of what we do with regards to AMR or other policy. And nationally also, the ministry also reviews its policy. We have an agricultural sector development plan so whatever we do in our plant protection policy should be aligned to that. What we call the FASDEP. Food and agricultural sector development plan.” [Committee Member, 30/06/2017]

4.11 Key Findings from the Study

1. The Draft Antimicrobial Resistance Policy of Ghana Followed International Discourse on Antimicrobial Resistance.
2. The Elements Of The Draft Antimicrobial Resistance Policy For Ghana Were Similar To That Of The WHO Global Action Plan On Antimicrobial Resistance.

CHAPTER FIVE

5.0 DISCUSSION

The aim of this study being to determine how international antimicrobial (AMR) discourse affects local AMR policy decisions in Ghana, the study identifies that the draft AMR policy for Ghana and the National Action Plan (NAP), followed international discourse and the content was fashioned after the global action plan (GAP). The AMR policy's main aim is to improve and maintain health of humans, animals and plants in their environment and promote food security through rational use and access to good quality antimicrobials that are safe, affordable and also to prevent the spread of resistant infections and slow the emergence of microorganisms that are resistant using a "One-Health" approach.

The policy had five key overarching elements for which other themes were developed.

There was however contextualization especially in aspects relating to making investments in research sustainable, where the Ghana policy focused on exploring antimicrobial development from herbal origin as well.

5.1 Draft Antimicrobial Resistance Policy for Ghana

The study shows that Ghana's draft antimicrobial resistance policy has an aim to improve and maintain health of humans, animals and plants in their environment and promote food security through rational use and access to good quality antimicrobials that are safe, affordable and also to prevent the spread of resistant infections and slow the emergence of microorganisms that are resistant using a "One-Health" approach. This was similar to the global action plan. (Chan, 2015) on antimicrobial resistance and the Korean and Canadian

policies (Ryu, 2017). The action plan for Canada, looks at regulating antimicrobial use in veterinary, humans and agriculture through provinces and territories and both the united states and the United kingdom plans talk about partnerships across groups (Cecchini, Langer, & Slawomirski, 2015).

Antimicrobial stewardship in Taiwan adopts a multi-disciplinary approach in containment (Huang et al., 2014) and (Tseng et al., 2012). Over the years, Africa has been a target for zoonotic diseases such as Rift Valley Fever, HIV AIDS and Ebola. Also, a third of the gross domestic products of African countries is from producing livestock (Okello, Bardosh, Smith, & Welburn, 2014). The One Health approach has thus been used successfully, in combating several diseases of zoonotic origin, as is the case of trypanosomiasis in Uganda, avian influenza (H5N1) in Nigeria and reduction of widespread incidence of rabies in Tanzania. The One health approach has been useful in containing Hendra disease in Australia (Landford & Nunn, 2012). The antimicrobial resistance policy also has five over-arching elements or objectives, similar to what was present in the global action plan. Generally, the policy is relevant for antimicrobial resistance containment, even though it fails to address issues such as resource mobilization, international collaboration and use of antimicrobials in rural communities in Ghana. Rational antimicrobial use is however captured, with antimicrobial stewardship as mainstay. Antimicrobial stewardship has been implemented successfully in Australia. (Cairns, Roberts, Cotta, & Cheng, 2015) (Australian Government Dept of Health and Dept of Agriculture, 2016), and Taiwan (Tseng et al., 2012) and (Huang et al., 2014) . The United States of America, Canada, and Germany also have their policies highlighting key priorities in the Global action plan (GAP), similar to that for Ghana. These countries focus on implementing policies through regulatory changes (Cecchini et al., 2015).

The study shows that both the GAP (Chan, 2015) and the Ghana Antimicrobial Resistance (AMR) policy and NAP captured the need for development of new antimicrobials with new mechanism of action and this was also aptly captured in the Ghana NAP (Chan, 2015). Ghana as a nation however, currently lacks the capacity for implementing this objective as we lack well-resourced laboratories with the appropriate technology for drug-discovery and development research. International collaboration of local pharmaceutical industries and established foreign pharmaceutical industries to provide technology transfer to local pharmaceutical companies and partnerships for drug discovery could instead be promoted in the policy and NAP. Product development partnerships, are also a useful means of fostering drug development that could be adopted (Cecchini et al., 2015) .The future for research and development of new antimicrobials is collaborative research. This would require that as an industry, intellectual property is reconsidered. Scientific research is currently being shared by researchers in open-sourced networks and this is useful to avoid duplication of efforts (Cecchini et al., 2015).

Although the national action plan indicates that surveillance data would be shared regionally and globally and also, some aspects of the Global Antimicrobial Surveillance System (GLASS) is captured in the National Action Plan(NAP), some NAPs, such as the Korean NAP included a sixth objective of international collaboration which was not in the Ghana NAP (Ryu, 2017)(WHO, 2016). Ghana is yet to be a member of the WHO's GLASS and the Food and Agricultural Organization's (FAO) ATLAS. Countries like Korea are already members, to adopt and share global surveillance information and best practices that will inform prescription patterns and use of antimicrobials (Ryu, 2017) (WHO, 2016). Due to migration, antimicrobial (AMR) AMR issues of one nation affects another nation and hence international collaboration is essential and the Ghana NAP needs

to reflect this (Options, 2017) (Hoffman et al., 2015) (Årdal et al., 2016). For Ghana however, international collaboration could go beyond sharing of surveillance data, to include collaborations in drug discovery and development. The future for research and development of new antimicrobials is collaborative research. This would require that as an industry, intellectual property is reconsidered. Scientific research is currently being shared by researchers in open-sourced networks and this is useful to avoid duplication of efforts (Cecchini et al., 2015).

The Ghana AMR Policy also includes an element on exploring the development of new antimicrobials from herbal medicine, which was not captured in the GAP (Chan, 2015). Although this may not have been captured in the GAP or other policies, this is key for Ghana due to the fact that a significant proportion of the citizenry utilize herbal medicines in the treatment of simple ailments, as well as human diseases that are specialized (Gyasi, 2015) and (Merrett, Bloom, Wilkinson, & MacGregor, 2016). This has led to the formation of the Traditional Medicines Practitioners Council (TMPC), Introduction of Herbal medicine studies at the Kwame Nkrumah University of Science and Technology and Integration of herbal Medicine into the health system of an initial 13 key institutions in the country. 13 pilot complementary and alternative medicines were selected for a pilot integration, with 4 still running actively currently [Personal Communication, 21/07/2017]. This inclusion in the policy is therefore a significant one that would address the gap of antimicrobial resistance from utilizers of herbal medicine.

The policy generally adopted a One Health approach similar to the GAP (Chan, 2015), the Australian Policy (Degeling et al., 2017) and (Cairns et al., 2015), the South African Policy (WHO, 2016) and the Korean NAP (Ryu, 2017). The key similarities are in the

promotion of rational use of antimicrobials in animal as, well as in humans, such as prohibition of the use of antimicrobials as ‘growth promoters’ (Chan, 2015).

5.2 Assessment of the Content of the National Action Plan

The study shows that the draft antimicrobial resistance (AMR) policy and National Action Plan (NAP) AMR are drafted by highly skilled technical people in various capacities pertaining to AMR.

Irrational medicine use was found to be one of the key drivers of resistance (GNDRP, 2016). Maintaining the balance between access and excess, where antimicrobial use is concerned is key. In Ghana, irrational use of antimicrobials is particularly high in remote or rural areas where the presence of health professionals is lacking (Snow et al., 2011). There are no specific intervention to address this problem, either by incentivizing rural healthcare practitioners to ensure even distribution of health professionals across the nation (Snow et al., 2011). Like many African countries, Ghana’s policy promotes rational drug use and restricts acquisition of antibiotics without a prescription but enforcement remains a problem (Byarugaba, 2004) . Although stakeholder participation in AMR policy draft in Ghana was immense, participation of key agencies responsible for regulation such as the Pharmacy Council, Medical and Dental Council, the Food and Drugs Authority (FDA), the Plant protection and Regulatory Services Division (PPRSD), and the Environmental Protection Agency (EPA) the policy-formulation process was low and this is likely to affect implementation. This is similar to Kenya, where participation from the animal and plant sectors is low (Kimani, Ngigi, Schelling, & Randolph, 2016).

The policy is largely funded by ReAct, World Health Organization (WHO) and the Food and Agricultural Organization (FAO) and hence demonstrates a lot of power as seen in the call of the FAO in 2016, for the inclusion of the One Health concept after the first policy draft had been finalized, and the re-alignment of the initial draft policy with the WHO Global action Plan in 2015. According to Dahl (1961), in his book, who governs, actors may exert power over decision makers based on resources they command. In this case, the WHO and the FAO were providing funding and technical support and so channeled the course of the policy along particular lines of interest. International Players have their own agenda and set objectives that may not be what the country necessarily requires at a given point in time. Out of policies come the laws of a country and hence countries must commit to funding their own policy formulations processes so that the policy direction can take into cognizance the country needs.

The main focus of the policy is rational use of antimicrobials at all levels, rather than restriction of use. Also, broad stakeholder consultation was done in the policy formulation process and inclusion of stakeholder concerns such as the One-Health approach in the policy was done and hence contestation is not likely to be an issue for the national AMR policy once approved. However, governance of the implementation phase of the policy might slow down implementation, due to the One Health concept.

The One Health concept, which focuses on adopting a multi-sectoral approach (human health Animal Health, Plants and environment), came up strongly in Ghana's NAP, and this was also captured in the NAPs of Korea (Ryu, 2017), Australia (Australian Government Dept of Health and Dept of Agriculture, 2016) and South Africa (CDDEP, 2014). Multi-sectoral collaboration is important in containing the phenomenon of antimicrobial resistance (AMR). This collaboration however, has to be targeted, with a

single focused leadership, to drive the agenda, for alignment of priorities and efforts in achieving AMR containment. A study on building bridges to operationalize One Health, indicated that though communication is essential for multisector collaboration, it also lies at the heart of the challenge of the collaboration (Cars et al., 2016). There is the risk that some ministries will overshadow the other and also there is the risk of passivity on the part of some ministries. It's therefore important to put measures in place to control this. Governance of the NAP implementation in Ghana is to be done by an inter-ministerial committee, made up of ministers from human and animal health, plants, environment supported by an AMR platform that comprises stakeholders from these sectors. In as much as multi stakeholder approach is good depending on the power of the stakeholders, implementation might be skewed in a certain direction. The One Health concept can still be maintained whereas a particular ministry, for instance, Ministry of Health, leads the implementation. Maintaining four ministries in the governance could result in power-play issues and bureaucracies that might slow down the implementation process. Where there is the need for the other sectors, experts within those sectors can be contracted to lead the implementation. Multi-sectoral governance in the implementation phase raises questions for further research. How will multisector governance affect implementation of the NAP?

Some aspects of the implementation phase, such as infection prevention and control, will be reliant on structures that are already in existence and hence implementation would be easy. Implementation of antimicrobial stewardship in Australia for example, has traditionally been limited to prescription restrictions and this is implementable in Ghana (Cairns et al., 2015). Other aspects like surveillance, however, require new systems and resources .In New England for example, surveillance data has been gathered voluntary provision by health facilities and laboratories, through centralized databases (Brisabois,

Cazin, Breuil, & Collatz, 1997) . Implementation of this poses a challenge due to the lack of well-resourced laboratories and centralized health-care database for tracking surveillance data. A policy that does not require additional administrative stress is likely to be implemented as planned. Other aspects of the NAP however would require new structures. A new secretariat is also to be set up to coordinate activities of AMR in Ghana. The study reveals that the NAP budget for implementation is Twenty one million dollars (\$21,000,000). The Fleming fund is expected to fund an initial 500,000 pounds during the inception phase and a further 1.8 million pounds for eighteen months, with the possibility of getting more support spending on implementation and the burning rate. The NAP however does not capture actions on resource mobilization, even though it does indicate that funds are to come from the Government of Ghana, donor partners, corporate institutions and Non-governmental organizations (NGOs). Even for resource-challenged countries like Nepal however, successful implementation of their antimicrobial surveillance programme, has been with very little dependence on external funding sources (Malla et al., 2014). No policy explicitly captures a resource mobilization plan, for low and middle income countries such as Ghana; this should form a part of the strategic plan.

Again, it would be useful for the government of Ghana, to provide a counterpart fund that would show its commitment to the policy and attract donors to invest in provision of resources to sustain the implementation of the policy. The Taiwan antimicrobial resistance policy targets the national government as a stakeholder and this has been a success factor in implementation of the stewardship programme in Taiwan. (Tseng et al, 2012) and (GAP, FAO)

As implementation of the AMR policy in Ghana progresses, the situation or context that led to the formulation of some aspects of the policy and NAP may change. It would

therefore be essential to have a policy-review timeframe, during which the policy would be reviewed and adjustments made. Thus, the policy and NAP capture a mid-term and end of term evaluation and review.

5.3 The Policy Formulation and Decision Making Process

The study reveals that the decision-making process on AMR is based on in-country factors such as research from the Antibiotic Drug Use, Monitoring and Evaluation of Resistance (ADMER) project, results from situational analysis and commissioned studies and cases of resistance in Key hospitals in the country.

International factors such as subject-matter exposure through conferences, United Nations, World Health Organization and Food and Agricultural Organization also affect the decision making process.

The availability of credible manpower and ability of key players to understand what international discourse sought to achieve and contextualize it to local prevailing situation is key.

Beyond subject matter exposure however, the study reveals that other factors like political commitment affect translation of international discourse to local decisions as predicted in Antimicrobial resistance—a threat to the world’s sustainable development (Fusheini, 2016), (Chan, 2015) and (FAO, 2016)

Beyond Political will and commitment however, the study reveals that the progress of the AMR policy formulation process revolves around the leadership of pharmaceutical services and resource-mobilization skills. Although political commitment is critical for policy development, the presence and leadership of an in-country process-driver, with

subject matter exposure, passion and commitment, as well as ability to mobilize resources is a key driver in any policy formulation process.

Ghana and South Africa are the only countries with a Policy in place in the World Health Organisation (WHO) Regional Office for Africa (AFRO) (CDDEP, 2014). Similar to the Global Antibiotic Resistance Partnership (GARP) concept used in the policy development in South Africa, and currently being used in Kenya, Vietnam and India, the Ghana Antimicrobial Resistance (AMR) policy formulation process, involves identification of local experts, uniting them in a working group and providing resources for them to analyze the antimicrobial resistance situation in Ghana, identify gaps and develop a policy and National Action plan (NAP), to address that (CDDEP, 2014). Similar to what pertained in the formulation of the Global action plan, a bottom-up, multi sector approach is adopted in the formulation of the NAP (Chan, 2015).

Whereas the policy for South Africa took a relatively shorter period to formulate (CDDEP, 2014), Ghana's policy formulation process has been in motion since 2011 and as of 2017; the policy is yet to be approved. According to Kingdon, (2011), for a policy window to be opened, where a policy comes into force, there needs to be a convergence of a problem stream, a policy stream and a politics stream. Currently, the problem stream is in place, as AMR is a real problem. The policy stream is in place and yet due to the fact that antimicrobial resistance is not an issue with immediate seeable physical impact, politicians have not attached the same urgency to it, as other policies with immediate physical impact and political implications. Ghana's AMR policy formulation process saw about five ministerial changes since inception and this has slowed the process. Also, upon finalization of the policy in 2016 and presentation to cabinet, the policy was not approved since it was an election year, where politicians were busy. In 2017 however, there is a

cabinet change and the policy approval process has to be re-initiated which will further delay implementation. In as much as the politicians are the ones who append their signature to policies, they are transient in their role and are usually advised by the technocrats in the ministries. The extent to which policies in Ghana, such as the National Health Insurance Scheme (NHIS), have been implemented, have been influenced by political and economic factors (Fusheini, 2016).

. Policy approval process should be highly dependent on the professionals and experts within the ministries, who are stationed there so that changes in ministers and political figures would have minimal effect on policy development and implementation (Fusheini, 2016).

Generally, International discourse influences the policy decisions in terms of the content and the process. Although international discourse has shaped the Ghana AMR policy, local experts worked together in contextualizing it so that it becomes a best fit for the Ghana situation.

The model used in the conceptual framework is appropriate, as international discourse on antimicrobial resistance (AMR) by the World Health Organization, WHO agencies of the United Nations (UN) such as the Food and Agricultural Organization and World organization on animal health (OIE) provided subject matter exposure that influences local decisions and triggered the Ghana AMR policy formulation aiming to contain antimicrobial resistance.

The study met its objectives of establishing how international discourse influenced local AMR decisions and policy formulation in Ghana, describing the draft AMR policy,

assessing the content of the draft AMR policy and National Action plan (NAP) and shedding light on the decision making and AMR policy formulation in Ghana.

In summary, the draft AMR policy for Ghana follows international discourse although it misses elements of international collaboration, resource mobilization and specific interventions for ensuring access and enforcing rational use of antimicrobials in rural areas, which have implications for implementation. A multi-sector and multi stakeholder approach is adopted for the AMR policy formulation. However, the lack of the absence of some of these players during the agenda-setting phase results in passivity during the policy formulation process. Also, multi-sector governance of the NAP may pose a challenge for meeting implementation timelines and could be a topic for further research. The decision making and policy-formulation process is centered on subject matter exposure, formation of an AMR platform, commissioning of studies and quarterly platform meetings. The policy formulation is based on international discourse, evidence from commissioned studies and Civil Society Organization (CSO) awareness campaigns, as well as documents review, to achieve a draft policy document .This is followed by stakeholder engagement and reformulation of the policy to include stakeholder comments and finally, initiation of the policy-approval process. The presence of key-policy drivers or champions with capacity for resource mobilization propels the policy process. Funding is useful for propelling the process however, changes in political setting has a significant effect on timelines stipulated for completion of the policy formulation cycle.

CHAPTER SIX

6.0 CONCLUSIONS

Policy decisions are not only influenced by international discourse but the ability of the key players and policy formulators to understand and interpret what international discourse seeks to achieve and contextualize it to local prevailing country situations, the prevailing health systems and capacity for implementation of actions from international discourse. Also, whereas funding by donors plays a role in propelling the policy formulation process it is not the key element in translation of international discourse into local policies or decisions. The in-country situation and ability of key players to accept the international discourse as a local problem, and changes in political figures affect the decisions and processes.

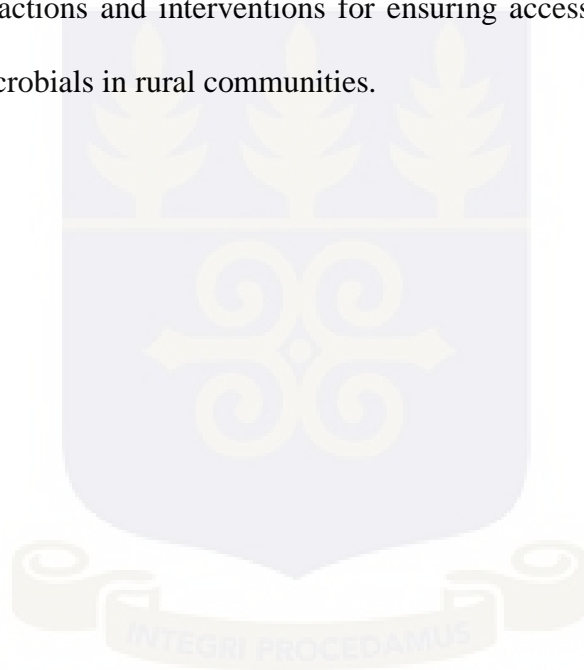
Also, political commitment is key in translating international discourse into local decisions however, the leadership that drives the policy formulation process or the ‘local champion’ with subject-matter exposure and his or her ability to demystify international discourse to in-country stakeholders, rally local and international support is what moves the process forward. The lack of active participation by certain key players raises questions for further research. How does an agency’s involvement in the agenda-setting process influence its participation in the actual policy formulation process and implementation?

6:1 Recommendations

- *Ghana Position on Issues:* The finding of this study that the draft Antimicrobial Resistance Policy of Ghana followed International discourse on Antimicrobial Resistance is useful for informing country leadership and policy direction. Ghana must have a position on certain topics of national Health, economic, educational,

etc. concerns, which will drive our discussions in international fora and how international discourse is translated locally, such that it is ensured that international best practices are also a local best-fit.

- *AMR Policy Content-* From the finding of the study that the elements of the draft Antimicrobial Resistance Policy for Ghana were similar to that of the WHO Global Action Plan on Antimicrobial Resistance, it would be useful to include international collaborations for technology transfer from established foreign pharmaceutical companies to local pharmaceutical companies, resource mobilisation actions and interventions for ensuring access and enforcing rational use of antimicrobials in rural communities.



REFERENCES

- Adesoji, A. T., Ogunjobi, A. A., Olatoye, I. O., & Douglas, D. R. (2015). Prevalence of tetracycline resistance genes among multi-drug resistant bacteria from selected water distribution systems in southwestern Nigeria. *Annals of Clinical Microbiology and Antimicrobials*, *14*(1), –. <https://doi.org/10.1186/s12941-015-0093-1>
- Årdal, C., Outtersen, K., Hoff, S. J., Ghafur, A., Sharland, M., Ranganathan, N., ... Røttingen, J. (2016). Antimicrobials : access and sustainable effectiveness 5 International cooperation to improve access to and sustain effectiveness of antimicrobials, 387. [https://doi.org/10.1016/S0140-6736\(15\)00470-5](https://doi.org/10.1016/S0140-6736(15)00470-5)
- Australian Government Dept of Health and Dept of Agriculture. (2016). Implementation Plan: Australia’s First National Antimicrobial Resistance Strategy 2015–2019., (November).
- Brisabois, a, Cazin, I., Breuil, J., & Collatz, E. (1997). Surveillance of antibiotic resistance in Salmonella. *Eurosurveillance*, *2*(3), 19–20. <https://doi.org/10.1098/rstb.2014.0080>
- Bryan, J. (2011). Resistance and Treatment, 715–720.
- Byarugaba, D. K. (2004). Antimicrobial resistance in developing countries and responsible risk factors. *International Journal of Antimicrobial Agents*, *24*(2), 105–110. <https://doi.org/10.1016/j.ijantimicag.2004.02.015>
- Cairns, K. A., Roberts, J. A., Cotta, M. O., & Cheng, A. C. (2015). Antimicrobial Stewardship in Australian Hospitals and Other Settings. *Infectious Diseases and Therapy*, *4*(1), 27–38. <https://doi.org/10.1007/s40121-015-0083-9>
- Carlet, J., Collignon, P., Goldmann, D., Goossens, H., Gyssens, I. C., Harbarth, S., ... Voss, A. (2011). Society’s failure to protect a precious resource: Antibiotics. *The Lancet*, *378*(9788), 369–371. [https://doi.org/10.1016/S0140-6736\(11\)60401-7](https://doi.org/10.1016/S0140-6736(11)60401-7)
- Carlet, J., Pulcini, C., & Piddock, L. J. V. (2014). Antibiotic resistance: A geopolitical issue. *Clinical Microbiology and Infection*, *20*(10), 949–953. <https://doi.org/10.1111/1469-0691.12767>
- Cars, O., Xiao, Y., Stålsby Lundborg, C., Nilsson, L. E., Shen, J., Sun, Q., ... Tomson, G. (2016). Building bridges to operationalise one health – A Sino-Swedish collaboration to tackle antibiotic resistance. *One Health*, *2*, 139–143. <https://doi.org/10.1016/j.onehlt.2016.09.002>
- CDDEP. (2014). Policies to Address Antibiotic Resistance in Low-and Middle-Income Countries.
- Cecchini, M., Langer, J., & Slawomirski, L. (2015). Antimicrobial Resistance in G7 countries and beyond: economic issues, policies, (September). Retrieved from

<https://www.oecd.org/els/health-systems/Antimicrobial-Resistance-in-G7-Countries-and-Beyond.pdf>

Census, H. (2010). SUMMARY REPORT OF FINAL.

Chan, M. (2015). *Global Action Plan on Antimicrobial Resistance*. WHO. Retrieved from www.wpro.who.int/entity/drug_resistance/resources/global_action_plan_eng.pdf

Ciorba, V., Odone, A., Veronesi, L., Pasquarella, C., & Signorelli, C. (2015). Antibiotic resistance as a major public health concern: epidemiology and economic impact. *Annali Di Igiene : Medicina Preventiva E Di Comunità*, 27(3), 562–79. <https://doi.org/10.7416/ai.2015.2048.Antibiotic>

Dahl, R. (1961). *Who Governs*, Yale University Press, (1st ed.)

Degeling, C., Johnson, J., Iredell, J., Nguyen, K.-A., Norris, J. M., Turnidge, J. D., ... Gilbert, G. L. (2017). Assessing the public acceptability of proposed policy interventions to reduce the misuse of antibiotics in Australia: A report on two community juries. *Health Expectations*, (May), 1–10. <https://doi.org/10.1111/hex.12589>

Egyir, B., Guardabassi, L., Monecke, S., Kwasi, K., Jemima, M., & Rhod, A. (2015). Journal of Global Antimicrobial Resistance Methicillin-resistant Staphylococcus aureus strains from Ghana include. *Integrative Medicine Research*, 3(1), 26–30. <https://doi.org/10.1016/j.jgar.2014.11.006>

Elmahdi, S., DaSilva, L. V., & Parveen, S. (2016). Antibiotic resistance of *Vibrio parahaemolyticus* and *Vibrio vulnificus* in various countries: A review. *Food Microbiology*, 57(August), 128–134. <https://doi.org/10.1016/j.fm.2016.02.008>

Essack, S. Y., Desta, A. T., Abotsi, R. E., & Agoba, E. E. (2016). Perspectives Antimicrobial resistance in the WHO African region : current status and roadmap for action, 1–6. <https://doi.org/10.1093/pubmed/fdw015>

FAO. (2016). THE FAO Action Plan on Antimicrobial Resistance. Retrieved from www.fao.org/publications

Framework, S. B. (2009). Framework Analysis : Research Note, 4(2), 72–79.

Frimodt-Moller, N. (2011). [The international surveillance of antibiotics resistance]. *Ugeskrift for Laeger*, 173(45), 2880–2882.

Fusheini, A. (2016). The Politico-Economic Challenges of Ghana's National Health Insurance Scheme Implementation. *Int J Health Policy Manag*, 5(9), 543–552. <https://doi.org/10.15171/ijhpm.2016.47>

Ghana National Drugs Programme, Draft Policy on AMR,2016

- Gulland, A. (2015). Countries are ill prepared to fight antimicrobial resistance, WHO says. *Bmj*, 350(apr30 8), h2340–h2340. <https://doi.org/10.1136/bmj.h2340>
- Gyansa-lutterodt, M. (2013). Antibiotic resistance in Ghana. *The Lancet Infectious Diseases*, 13(12), 1006–1007. [https://doi.org/10.1016/S1473-3099\(13\)70196-8](https://doi.org/10.1016/S1473-3099(13)70196-8)
- Gyasi, R. M. (2015). Relationship between health insurance status and the pattern of traditional medicine utilisation in Ghana. *Evidence-Based Complementary and Alternative Medicine*, 2015. <https://doi.org/10.1155/2015/717926>
- Hoffman, S. J., Caleo, G. M., Daulaire, N., Elbe, S., Matsoso, P., & Mossialos, E. (2015). Strategies for achieving global collective action on antimicrobial resistance, (January), 867–876.
- Holloway, K. A., Rosella, L., & Henry, D. (2016). The impact of WHO essential medicines policies on inappropriate use of antibiotics. *PLoS ONE*, 11(3), 1–12. <https://doi.org/10.1371/journal.pone.0152020>
- Huang, L., Kuo, C., Lin, Y., Chen, Y., Wong, Y., & Lin, Y. (2014). Evaluation of the effectiveness of implementing an antimicrobial stewardship program in a medical center in Taiwan. *Value in Health*, 17(7), A684–A685. <https://doi.org/10.1016/j.jval.2014.08.2560>
- Irrgang, A., Roschanski, N., Tenhagen, B. A., Grobbel, M., Skladnikiewicz-Ziemer, T., Thomas, K., ... K??sbohrer, A. (2016). Prevalence of mcr-1 in E. coli from livestock and food in Germany, 2010-2015. *PLoS ONE*, 11(7), 2010–2015. <https://doi.org/10.1371/journal.pone.0159863>
- Iwu, A., Juliana, C., Chuks, B., Chikwelu, L., & Kotze, A. (2016). Multidrug-Resistant Salmonella Isolates from Swine in the Eastern Cape Province , South Africa Abstract :, 79(7).
- Jasovský, D., Littmann, J., Zorzet, A., & Cars, O. (2016). Antimicrobial resistance—a threat to the world’s sustainable development. *Upsala Journal of Medical Sciences*, 121(3), 159–164. <https://doi.org/10.1080/03009734.2016.1195900>
- Kimani, T., Ngigi, M., Schelling, E., & Randolph, T. (2016). One Health stakeholder and institutional analysis in Kenya. *Infection Ecology & Epidemiology*, 6, 31191. <https://doi.org/10.3402/iee.v6.31191>
- Kingdon J. Agendas, alternatives, and public policies (longman classics edition); 2002.
- Kurbatova, E. V., Dalton, T., Ershova, J., Tupasi, T., Caoili, J. C., Walt, M. Van Der, ... Peter Cegielski, J. (2015). Additional drug resistance of multidrug-resistant tuberculosis in patients in 9 countries. *Emerging Infectious Diseases*, 21(6), 977–983. <https://doi.org/10.3201/eid2106.141329>

- Landford, J., & Nunn, M. (2012). Good governance in “One Health” approaches. *Special Issue: Good Governance and Financing of Efficient Veterinary Services.*, 31(2), 561–575.
- Laxminarayan, R., & Chaudhury, R. R. (2016). Antibiotic Resistance in India: Drivers and Opportunities for Action. *PLoS Medicine*, 13(3), 1–7.
<https://doi.org/10.1371/journal.pmed.1001974>
- Leung, E., Weil, D. E., Raviglione, M., & Nakatani, H. (2011). The WHO policy package to combat antimicrobial resistance. *Bulletin of the World Health Organization*, 89(5), 390–392. <https://doi.org/10.2471/BLT.11.088435>
- Maama-Maime, L. B., Mareka, M., Ershova, J. V., Tlali, T. E., Kao, K., Phalatse, M., ... Holtz, T. H. (2015). Antituberculosis drug resistance survey in Lesotho, 2008–2009: Lessons learned. *PLoS ONE*, 10(7), 2008–2009.
<https://doi.org/10.1371/journal.pone.0133808>
- Malla, S., Dumre, S. P., Shakya, G., Kansakar, P., Rai, B., Hossain, A., ... Rahman, M. (2014). The challenges and successes of implementing a sustainable antimicrobial resistance surveillance programme in Nepal. *BMC Public Health*, 14(1), 269.
<https://doi.org/10.1186/1471-2458-14-269>
- Merrett, G. L. B., Bloom, G., Wilkinson, A., & MacGregor, H. (2016). Towards the just and sustainable use of antibiotics. *Journal of Pharmaceutical Policy and Practice*, 9(1), 31. <https://doi.org/10.1186/s40545-016-0083-5>
- Newman, M. J., Frimpong, E., Donkor, E. S., Opintan, J. A., & Asamoah-Adu, A. (2011). Resistance to antimicrobial drugs in Ghana. *Infection and Drug Resistance*, 4(1), 215–220. <https://doi.org/10.2147/IDR.S21769>
- O’Brien, T. F. (1997). The global epidemic nature of antimicrobial resistance and the need to monitor and manage it locally. *Clinical Infectious Diseases*, 24 Suppl 1, S2–8.
https://doi.org/10.1093/clinids/24.Supplement_1.S2
- Okeke, I. N., Klugman, K. P., Bhutta, Z. A., Duse, A. G., Jenkins, P., O’Brien, T. F., ... Laxminarayan, R. (2005). Antimicrobial resistance in developing countries. Part II: Strategies for containment. *Lancet Infectious Diseases*, 5(9), 568–580.
[https://doi.org/10.1016/S1473-3099\(05\)70217-6](https://doi.org/10.1016/S1473-3099(05)70217-6)
- Okello, A. L., Bardosh, K., Smith, J., & Welburn, S. C. (2014). One Health: Past Successes and Future Challenges in Three African Contexts. *PLoS Neglected Tropical Diseases*, 8(5). <https://doi.org/10.1371/journal.pntd.0002884>
- Options, A. (2017). International cooperation to improve access to and sustain effectiveness of antimicrobials, 6736(November 2015).
- Pullon, H. W., Gommans, J., Thomas, M. G., Metcalf, S., Grainger, R., & Wild, H. (2016). Antimicrobial resistance in New Zealand: the evidence and a call for action. *The New Zealand Medical Journal*, 129(1444), 103–110.

- Rasmussen, M. M., Opintan, J. A., Frimodt-m, N., & Styrihave, B. (2015). Beta-Lactamase Producing Escherichia coli Isolates in Imported and Locally Produced Chicken Meat from Ghana, 1–15. <https://doi.org/10.1371/journal.pone.0139706>
- Report of the 2nd Meeting of the Global AMR Surveillance System (GLASS) Collaborative Platform Meeting Report.* (2016). Retrieved from <http://www.who.int/antimicrobial-resistance/events/2017-Dec-15-16-GLASS-meeting-report.pdf?ua=1>
- Roca, I., Akova, M., Baquero, F., Carlet, J., Cavalieri, M., Coenen, S., ... Vila, J. (2015). The global threat of antimicrobial resistance: Science for intervention. *New Microbes and New Infections*, 6(January 2015), 22–29. <https://doi.org/10.1016/j.nmni.2015.02.007>
- Ryu, S. (2017). The new Korean action plan for containment of antimicrobial resistance. *Journal of Global Antimicrobial Resistance*, 8, 70–73. <https://doi.org/10.1016/j.jgar.2016.10.013>
- Sector Report Health and Life Sciences Ghana. (2014).
- Shallcross, L. J., & Davies, S. C. (2014). The World Health Assembly resolution on antimicrobial resistance. *The Journal of Antimicrobial Chemotherapy*, 69(11), 2883–5. <https://doi.org/10.1093/jac/dku346>
- Simonsen, G. S., Tapsall, J. W., Allegranzi, B., Talbot, E. A., & Lazzari, S. (2004). The antimicrobial resistance containment and surveillance approach--a public health tool. *Bulletin of the World Health Organization*, 82(12), 928–34. <https://doi.org/S0042-96862004001200009>
- Snow, R. C., Asabir, K., Mutumba, M., Koomson, E., Gyan, K., Dzodzomenyo, M., ... Kwansah, J. (2011). Key factors leading to reduced recruitment and retention of health professionals in remote areas of Ghana: a qualitative study and proposed policy solutions. *Human Resources for Health*, 9(1), 13. <https://doi.org/10.1186/1478-4491-9-13>
- The Lancet Infectious Diseases. (2016). Time for global political action on antimicrobial resistance. *The Lancet Infectious Diseases*, 16(10), 1085. [https://doi.org/10.1016/S1473-3099\(16\)30341-3](https://doi.org/10.1016/S1473-3099(16)30341-3)
- This, A., Indies, F. W., Guiana, F., Guiana, F., & Plan, C. (2006). Mycobacterium tuberculosis Drug Resistance , Ghana, 12(7), 1170–1172.
- Thomson, P. (2016). General Assembly of the United Nations: Opening remarks at High-Level Meeting on Antimicrobial Resistance. Retrieved from <http://www.un.org/pga/71/2016/09/21/opening-remarks-at-high-level-meeting-on-antimicrobial-resistance/>
- Tseng, S.-H., Lee, C.-M., Lin, T.-Y., Chang, S.-C., Chuang, Y.-C., Yen, M.-Y., ... Chang, F.-Y. (2012). Combating antimicrobial resistance: Antimicrobial stewardship

program in Taiwan. *Journal of Microbiology, Immunology and Infection*, 45(2), 79–89. <https://doi.org/http://dx.doi.org/10.1016/j.jmii.2012.03.007>

United Nations. (2016). High Level Meeting on Antimicrobial Resistance, September, 2016 UN Website.

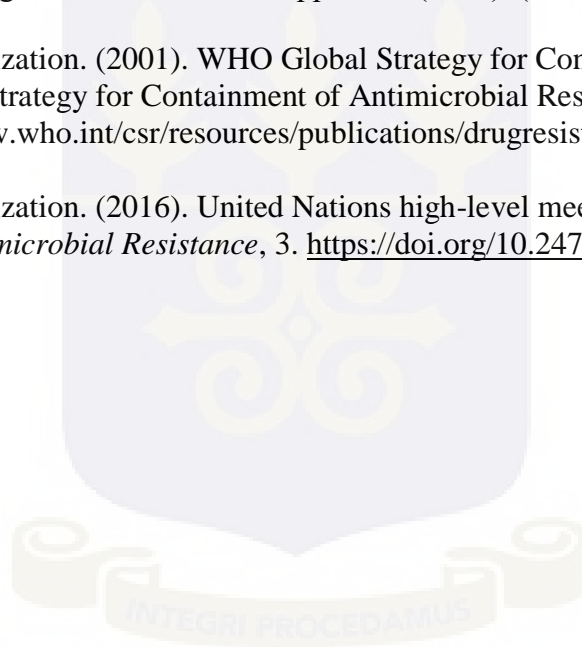
WHO. (2016a). At UN, global leaders commit to act on antimicrobial resistance. *Who*, 21–23. Retrieved from <http://www.who.int/mediacentre/news/releases/2016/commitment-antimicrobial-resistance/en/>

WHO. (2016b). Ministerial meeting in the hague. Retrieved from http://www.who.int/antimicrobial-resistance/global-action-plan/Outcome_Statement_haguemeeting_2014_english.pdf?ua=1

WHO African Region working towards Prevention and Containment of Antimicrobial Resistance Using the " One Health " Approach. (2016), (March), 2016–2018.

World Health Organization. (2001). WHO Global Strategy for Containment of Antimicrobial Strategy for Containment of Antimicrobial Resistance, 99. Retrieved from http://www.who.int/csr/resources/publications/drugresist/en/EGlobal_Strat.pdf

World Health Organization. (2016). United Nations high-level meeting on antimicrobial resistance. *Antimicrobial Resistance*, 3. <https://doi.org/10.2471/BLT.16.020916>



APPENDICES

Appendix 1: Consent Form

My name is JACQUELINE DARFOOR, an MPH student from the Faculty of Public Health at the University of Ghana, Legon. I am doing a research on ‘Assessment of International Focus and Discourse on Antimicrobial Resistance (AMR) On Local Decision-Making on AMR in Ghana’.

The research looks at the view of members of the antimicrobial working group and representatives of other organizations with interest in AMR containment, on local decision-making on AMR and how it aligns with international focus and discourse

I would like to pick your thoughts and knowledge on this in an interview. Selected members of the antimicrobial working group and selected representatives of agencies with particular interest in AMR, have been proposed for inclusion in the study. Information from the interview will be kept confidential and you have the right to decline an interview.

The estimated time frame for an interview is 45-60minutes and you have the right to refuse to participate in the study. Also, in the event that you agree to be a part of the study, you may stop whenever you wish or refuse to answer questions you are uncomfortable with. .

Apart from my research team and members of the Ethics Committee , nobody would have access to the information. Also, your name would not be mentioned in any report that would come out of this study

Prior to giving consent

Are there any questions regarding the research that you wish to ask? Yes |____| No |____|

Please note your questions here

.....

For further queries please contact:

Jacqueline Darfoor

Department of Health Policy, Planning and Management

School of Public Health

University of Ghana

[Tel:- +233268166752](tel:+233268166752)/[+233501412915](tel:+233501412915)

Email: Jacqui.darfoor@yahoo.com

Or:

Hannah Frimpong,

GHS-ERC Administrator

Office: 233 (0) 243235225

Email: Hannah.Frimpong@ghsmail.org

Nana Abena Kwaa

Assistant GHS-ERC Administrator

Mobile: 0244712919

Email: nanatuesdaykad@yahoo.com

CONSENT OF STUDY-PARTICIPANT

I have read and or understood the information regarding this study and have agreed to participate on my own volition. I am aware of my right to withdraw from the study at any time that I feel the need to. I also understand that findings of this study will be available to readers in the University of Ghana library and may also be published.



Signature:

.....

OR

L/R Thumb Print

Appendix 2: Interview Guide

- What has been your involvement in the AMR policy formulation process in Ghana?
- What do you make of the ongoing discussions on AMR at the global level?
- What is the local AMR policy discourse at the local level?
- What policy has been in place for antimicrobials prior to the formulation of the draft national action plan?
- What necessitated the formulation of the national action Plan?
- How has the discussion at the international level influenced discourse at the local level?
- Please describe the key elements of the draft national action plan on AMR containment.
- How does the national action plan compare with the global action plan?
- Please describe the decision-making/policy formulation process on AMR containment in Ghana?
- At what stage of the process is the national action plan?
- Who were the key stakeholders in the policy-formulation process
- What has been their level of participation and at what point did the stakeholders come on board.

- For stakeholders who were not part of the process initially but joined later, what factors led to their being brought on board?
- What are the challenges that you face in translating international discourse into local policies?
- What are the factors that influence the policy decision-making process in Ghana?
- What role does donor support play in translation of international discourse into local policy-realities?

