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Multidisciplinary and multisectoral coalitions as catalysts for action against antimicrobial resistance: Implementation experiences at national and regional levels

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ABSTRACT

The multi-faceted complexities of antimicrobial resistance (AMR) require consistent action, a multidisciplinary approach, and long-term political commitment. Building coalitions can amplify stakeholder efforts to carry out effective AMR prevention and control strategies. We have developed and implemented an approach to help local stakeholders kick-start the coalition-building process. The five-step process is to (1) mobilise support, (2) understand the local situation, (3) develop an action plan, (4) implement the plan, and (5) monitor and evaluate. We first piloted the approach in Zambia in 2004, then used the lessons learned to expand it for use in Ethiopia and Namibia and to the regional level through the Ecumenical Pharmaceutical Network [EPN]. Call-to-action declarations and workshops helped promote a shared vision, resulting in the development of national AMR action plans, revision of university curricula to incorporate relevant topics, infection control activities, engagement with journalists from various mass media outlets, and strengthening of drug quality assurance systems. Our experience with the coalition-building approach in Ethiopia, Namibia, Zambia, and with the EPN shows that coalitions can form in a variety of ways with many different stakeholders, including government, academia, and faith-based organisations, to organise actions to preserve the effectiveness of existing antimicrobials and contain AMR.

Introduction

Antimicrobial resistance (AMR) is an ever-increasing multinational public health crisis that causes an estimated 700,000 deaths globally each year (Institute of Medicine, 2010; The Review on Antimicrobial Resistance, 2016). By 2050, if left unaddressed, that annual number is projected to balloon to 10 million deaths, while the cumulative costs shouldered by both patients and health systems across the globe are expected to reach $100 trillion (The Review on Antimicrobial Resistance, 2015). AMR could also erase up to 3.8% of the world's gross domestic product annually by 2050 (World Bank, 2017).

Although drug resistance occurs naturally with antimicrobial use, many interrelated factors accelerate the development and spread of AMR, including misuse and overuse of antimicrobials in health care and community settings and inappropriate use of antibiotics in animal production (Institute of Medicine, 2010; Laxminarayan et al., 2013). While AMR is a global problem, low- and middle-income countries (LMICs) face additional challenges (Laxminarayan & Heymann, 2012; Nwenkea, Tapha-Sosseh, & Sosa, 2009; World Health Organization [WHO], 2015a), such as –

- Circulation of substandard and falsified medicines
- Inappropriate prescribing practices and incentives
- Substandard infection prevention and control practices
- Poor hygiene, sanitation, and water quality
- Weak regulatory and supply chain systems

The multifaceted components of AMR require coordination across several sectors and a multitude of stakeholders representing human health, animal health, agriculture, and environment – known and promoted as the 'One Health' approach (WHO, 2015b; WHO, United Nations Food and Agriculture Organization [FAO], World Organization for Animal Health [OIE], 2016). However, this type of tactic has been limited in LMICs (WHO, 2015a). In its 2015 Global Action Plan (2015b, p. 13), the WHO calls for member states to 'promote and support establishment of multisectoral (one-health) coalitions to address AMR at local or national level, and participation in such coalitions at regional and global levels', as part of its objective to improve awareness and understanding of AMR. WHO, along with the FAO, and the OIE (2016), provided further guidance to member states on establishing multisectoral coordinating groups as a mechanism to help develop national action plans on AMR in line with a resolution made at the 68th World Health Assembly (2015).

These types of diverse coalitions may not only facilitate the development of national action plans, but also build consensus and a shared vision among stakeholders to advocate for policy and regulatory changes, raise awareness among health professionals and the public, and provide leadership to implement antimicrobial stewardship interventions. For example, STRAMA (the Strategic Programme against Antibiotic Resistance), a multi-tiered, high-level task force in Sweden, successfully oversaw multi-pronged efforts to decrease excessive antibiotic use (Molstad, Cars, & Struwe, 2008). Development of similar coalitions (grassroots, government-led, or otherwise) in LMICs has lagged, although some countries have made steps to increase collaboration to develop WHO-recommended national action plans or other antimicrobial stewardship programmes (Ethiopia Food, Medicine, and Healthcare Administration and Control Authority, 2015; Sumpradit et al., 2017; Wertheim et al., 2013). Such coalitions are important not only at the national level but also at local and regional levels (Ecumenical Pharmaceutical Network [EPN] & Strengthening Pharmaceutical Systems [SPS], 2008).

For more than 10 years, we have been using a systems-based approach to help LMICs address the AMR threat through the U.S. Agency for International Development-funded Systems for Improved Access to Pharmaceuticals and Services (SIAPS), SPS, and Rational Pharmaceutical Management (RPM) Plus programmes. This article describes our approach to build and strengthen coalitions to catalyse action against AMR and provides national case study examples from Ethiopia, Namibia, Zambia, and one regional initiative. We also share lessons learned from the implementation experiences in these four settings to inform the development of similar coalitions in other LMICs. While we recognise the importance of One Health in addressing AMR, this paper focuses on multidisciplinary actions within the human health sector; however, some coalitions included have collaborated with the animal health and agriculture sectors.

Programme description

Our approach is based on building coalitions to lead actions to address the threat of AMR, including increasing AMR awareness and advocacy; developing local, regional, or national plans on AMR; and

Box 1. The five-step process of coalition building.

Building Coalitions for Containing Antimicrobial Resistance: A Guide

1) Mobilizing support

2) Understanding the local situation

3) Formulating an action plan

4) Implementing the plan

5) Monitoring and evaluation
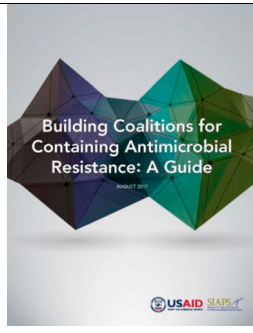
supporting locally relevant antimicrobial stewardship interventions. We first piloted the approach in Zambia in 2004, then used lessons learned to refine subsequent coalition-building efforts in Ethiopia and Namibia and with the EPN at a regional level. We have also adapted elements of the approach to support stakeholder coalitions at facility level. In Jordan, for example, we mobilised a multidisciplinary group of stakeholders from three hospitals, who implemented an antimicrobial stewardship and continual quality improvement programme. The group developed protocols and procedures that improved antibiotic prophylaxis for caesarean sections and resulted in substantial cost savings (Gammouh & Joshi, 2013).

After extensive experience with implementation, we developed a practical guide to walk countries through the coalition-building process with step-by-step instructions, examples, tools, templates, and resources (Box 1) (SIAPS, 2017).

Depending on local context and feasibility, we sometimes adapted the approach or increased our focus on specific steps. Figure 1 illustrates our approach.

Mobilising support

Coalitions – defined here as a group of people or organisations working together to affect change on a particular issue (Cohen, Baer, & Satterwhite, 2002) – can form in a variety of ways and at many different levels. For a complex issue such as AMR, building a coalition requires involving, educating,
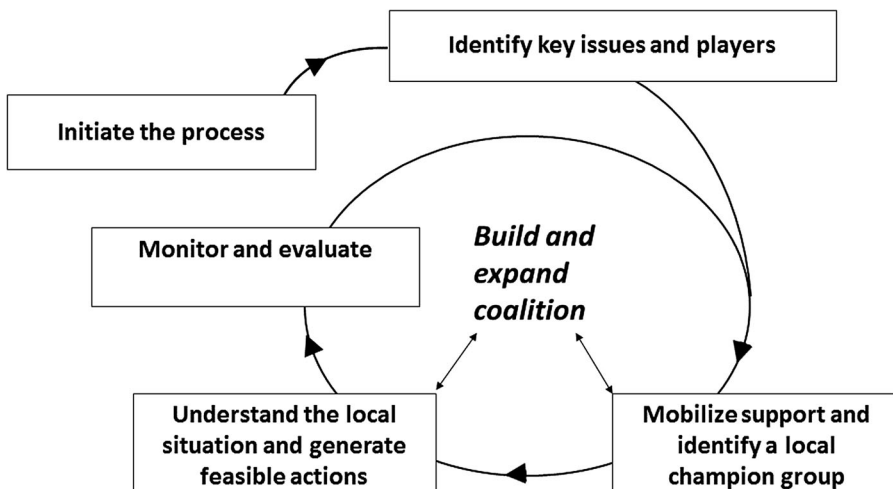

Figure 1. Elements of a systematic approach to building a coalition against AMR.

Box 2. Initial composition of AMR task force formed in Ethiopia in 2006.

Drug Administration and Control Authority (Coordinator)
Ethiopian Health and Nutrition Research Institute
Ministry of Health
US Centers for Disease Control and Prevention
US Agency for International Development
RPM Plus/Management Sciences for Health
WHO
Addis Ababa University
Ethiopian Medical Association
Ethiopian Public Health Association
Ethiopian Pharmaceutical Association
Ethiopian Nursing Association
International Network for Rational Use of Drugs/Ethiopia

and seeking commitment from a varied group of stakeholders, including health care providers, pharmacists, consumers, professional associations, donors, development partners, as well as representatives from the government, private sector, and media. Based on the initial interactions of this large stakeholder group, a smaller champion group or core working group may form to spearhead the expansion of efforts. Box 2 lists the organisations represented in Ethiopia's initial core working group formed in 2006. Table 1 describes the types of stakeholders and sectors engaged across the coalitions in Ethiopia, Namibia, Zambia, and EPN.

The nature of coalitions, which are sometimes disparate, requires strong leadership and a dedication to advocacy, especially within the core working group. If initial engagement is lacking, strategic and targeted advocacy efforts may be needed to generate additional interest in the coalition at this early stage. Leaders or champions already involved in or committed to addressing AMR may emerge from any level, sector, or discipline, including the grassroots level. These local champions often act as the spark for the larger coalition's creation, and bringing these champions together to form a coalition can be enough to launch local actions.

New coalitions benefit from early structure; therefore, the core working group needs to develop terms of reference that describe its purpose as well as a scope of work to help direct the coalition's work. The process for how decisions are made and how roles and responsibilities are assigned needs to be explicit, and as new members are added, the leadership will need to nurture continued consensus on the group's mission and vision.

Understanding the local situation

Developing an understanding of the drivers of AMR at the local, national, or regional levels is a critical first step for coalitions. This understanding helps to identify potential areas for action and which actions may be most feasible, attainable, and of the highest priority (Nguyen et al., 2013). Such information also informs advocacy and communication efforts and guides the design of containment strategies and interventions. The core working group should compile information on the local situation and assess gaps to determine the need for additional data. Data collection may occur through literature and document reviews, key informant interviews, and health/pharmacy/laboratory records, among other relevant sources. This step can focus on more easily accessible data – the desire to collect extensive amounts of high-quality data or new information should not be a limiting factor in moving forward. Disseminating the results of this rapid assessment may garner additional support for the coalition and raise awareness of the AMR issue. An AMR situational assessment should consider but not be limited to the following topics:

- Level of knowledge and understanding about AMR
- Pharmaceutical management practices including prescribing, dispensing, and use behaviours

Table 1. Stakeholder involvement in AMR coalitions: Zambia, Ethiopia, Namibia, EPN.

Coalition/ Country	Approx. number attending	Call-to-action meeting year	Stakeholders involved in coalition call-to-action meetings																			
			Ministry of Health	Ministry of Finance	Ministry of Agriculture	Pharmacy Department	Regulatory agencies	Health bureaus/ district health management teams	Public sector-health facilities	Private sector-health facilities	Academia/ Research	Funding agencies/ International partners	Consumer groups	Media	Pharmaceutical companies/ manufacturers/ suppliers	Non-governmental organisations	Faith-based organisations	Insurance companies	UN – WHO	Professional associations	Pharmacies/ Dispensers	Veterinary stakeholders
AMR Advocacy Working Group/ Zambia	70	2004	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
AMR Task Force/ Ethiopia	69	2006	✓		✓		✓	✓	✓		✓	✓		✓	✓	✓				✓	✓	✓
AMR Stakeholders/ Namibia	66	2013	✓			✓			✓	✓	✓	✓				✓					✓	✓
EPN/ Multiple	32	2008							✓		✓				✓	✓	✓					

- Infection prevention and control practices
- Surveillance capacity
- Media presence and communication channels
- Stakeholder analysis (Table 2)

Formulating an action plan

With sufficient initial interest in the coalition and a rapid assessment of the local AMR situation, meetings to build consensus and develop call-to-action declarations and other action plans can help solidify the coalition's vision and scope. The core working group and other stakeholders discuss the findings from the local situational analysis and come to consensus on how to address the problems identified, including what the priorities are, who should take the lead, and what is feasible to accomplish. An action plan should focus on realistic local strategies that capitalise on existing initiatives, systems, and resources, while at the same time exploring opportunities for generating new resources or added-value initiatives. The action plan should describe the coalition's goals and objectives, available resources, a timeline for activities, monitoring and evaluation (M&E) of the

Table 2. Results from AMR stakeholder analysis in Zambia, 2004.

Stakeholder	Role in AMR	Interest in AMR	Knowledge of issues and solutions	Position	Perceived impact of issue on stakeholder	Area of influence
National Malaria Control Center	Leadership, provide data	High	High	Supportive	High	Advocacy, technical
WHO	Provide evidence, technical support, leadership	High	High	Supportive	High	Advocacy, technical, finance
Faculty of General Practitioners	Peripheral	Medium	Medium	Non-mobilised	Medium	Technical, advocacy
Pharmacy & Poisons Board	Regulatory, provide data	High	High	Supportive	High	Advocacy, implementation of interventions, regulatory
Central Board of Health	Leadership, provide data, lend authority to decisions and actions	High	High	Supportive	High	Advocacy, implementation of interventions
Madison Insurance	Pressure insurers to take interest and act on AMR	Medium	Low	Non-mobilised	Medium	Advocacy, implementation of interventions
National HIV/AIDS/STI/TB Council	Leadership, develop guidelines	Low	High	Non-mobilised	Low	Advocacy, development and implementation of interventions
Alliance for the Prudent Use of Antibiotics	Provide data and other technical support, advocacy	High	High	Supportive	High	Advocacy, peer guidance, research
UNICEF	Provide data, leadership	High	High	Supportive	High	Advocacy, technical, finance
Interchem	Pharmaceutical supply and management, technical support	Medium	Low	Non-mobilised	Medium	Pharmaceutical supply and quality
Churches Health Association of Zambia	Pharmaceutical supply management, technical support, provide data	High	High	Supportive	High	Advocacy, pharmaceutical supply, implementation of interventions

Table 3. Results from a SWOT analysis conducted by an AMR core working group in Zambia.

Strengths	Weaknesses
Diversity – understanding	The group does not have enough time
Credibility	Members of the group all have day jobs
Team members representing general practitioners' groups	Inconsistency of group members (not attending meetings, etc.)
Professional expertise	Volunteers (no one gets paid)
Group members are concerned (committed)	Lack of commitment from some team members
Professional training (of group members)	Limited resources
Team members are volunteers (thus committed)	
Support team available (MSH, consultants)	
How do we maximise our strengths?	**How do we minimise our weaknesses?**
We need to utilise the support group.	*By sharing the load (presentations, etc.) among all members of the group and by recruiting (at least 2) additional group members who are enthusiastic and committed*
Opportunities	**Threats**
Possibility of success	Other special interested groups
Reduction of AMR problem	Pharmaceutical companies
External support (environment is conducive)	No control over stakeholders
Access to information	Limited government money
Facilitate the implementation of WHO guidelines	Lack of government support on AMR at the moment
	Cultural barriers (resistance to change/family influence)
	Lack of knowledge by the external bodies (media) to make sure the message is loud and clear

plan that includes targets, and other implementation considerations. Although no set of interventions will be appropriate for all settings, many overarching areas that typically emerge align with WHO recommendations (2015b).

During this planning phase, a simple strengths, weaknesses, opportunities, threats [SWOT] analysis may help a working group understand their situation and prioritise actions. Table 3 illustrates the results from SWOT analysis conducted by the AMR core working group in Zambia.

Implementing the plan

Moving an activity from a line item in an action plan to an actual programme takes organisation; therefore, the core working group must plan for the technical and logistical management issues needed to carry out each activity. Before developing specific work plans to complete the action plan objectives, the working group must assess and quantify the coalition's existing resources and identify any potential resource gaps for implementation activities. Work plans and corresponding indicators should be developed to guide and monitor the execution of coalition activities. Similar to the planning phase, SWOT analyses may help inform the implementation of coalition activities.

Monitoring and evaluation

Although often easily overlooked, M&E is an integral part of a coalition's growth and survival and is critical for providing feedback on successes and failures and direction for future action. In addition, the data generated can supply the evidence needed to provoke policy change and resource mobilisation. Both periodic routine monitoring and interim monitoring assessments are important barometers for coalition performance, and coalitions should define process indicators to track change. Box 3 provides sample structure- and process-related indicators developed during a regional AMR workshop to monitor progress of the EPN's regional AMR containment activities (EPN & SPS, 2008). Outcome indicators typically need more time and resources, but as coalitions expand and mature, opportunities may arise to track a few locally feasible outcome indicators, or at least some proxy indicators that show progress towards the expected outcomes.

Box 3. Sample indicators to measure AMR advocacy and containment developed by EPN regional workshop participants.

Institutional indicators
- Number of institutions with active drug and therapeutics committees (DTCs)
- Number of days antibiotics were out of stock
- Number of hospitals with infection control policies and procedures
- Number of activities on AMR that are taking place in the institution
- Number of policies on infection control that are displayed in the institution
- Availability of focal persons on infection control
- Availability of top ten diseases list in the institutions and their treatment guidelines
- Number of audits conducted on AMR

National/network indicators
- Number of registered medicine outlets
- Number of institutions involved in AMR-related activities
- Number of hours of media coverage on AMR
- Number of AMR meetings and activities conducted at regional/national level with relevant people
- Number of focal persons in the network who are reference persons for AMR activities
- Percentage of functional laboratories that can do culture and sensitivity within the network
- Number of information, education, and communication materials that have been distributed
- Number of research publications on AMR

The local coalition in Jordan, mentioned previously, developed and longitudinally tracked a set of indicators to monitor its antimicrobial stewardship activities. These indicators ultimately provided the data to support a government mandate to adapt and use the coalition-developed antibiotic prophylaxis protocol for caesarean section in all public sector hospitals providing obstetric services (Gammouh & Joshi, 2013). In Zambia, the coalition assessed their activities through an interim monitoring review conducted by an external consulting firm. The assessment team collected data through a combination of in-depth interviewing and review of both published and grey literature. The team reviewed more than 50 publications and interviewed 29 relevant AMR stakeholders (Links Media, 2006). The results helped shed light on the coalition's vulnerabilities and potential ways it could improve its functionality and engagement with other stakeholders.

Implementation experience

The coalitions in Ethiopia, Namibia, Zambia, and EPN created momentum for a variety of locally relevant activities including those designed to strengthen health systems to better prepare for responding to and containing AMR. These activities included revising preservice training for health care providers, updating standard treatment guidelines (STGs), developing and implementing antimicrobial stewardship interventions, and increasing public awareness through mass media and public messaging (Table 4).

In Zambia in 2004, we identified stakeholders interested in or already engaged in AMR-related work to comprise the Advocacy Working Group which was endorsed by the Zambian government's Central Board of Health. With our initial support, the working group held a kick-off meeting and conducted a rapid assessment of the local situation. Using the results of the rapid assessment, the Advocacy Working Group developed context-specific solutions and a call-to-action document that focused the group's activities on key areas of action. Subsequently, Ethiopia, Namibia, and EPN started with Zambia's coalition-building approach, then adapted it to their own contexts. In each of the four implementation experiences, the coalitions held a kick-off meeting bringing together multidisciplinary stakeholders. For example, in Ethiopia, the initial jump-start meeting included a wide range of representatives from the human health sector including the Ministry of Health, research institutions, academia, media, non-governmental organisations, and professional associations. The resulting initial core group (Box 2), now known as the National Advisory Committee for AMR Prevention and Containment, has since expanded to include representatives from the

Table 4. Actions and results from coalitions in Ethiopia, Namibia, Zambia, and through EPN.

Coalition/country	Key areas of action	Key AMR-related activities/results
Zambia	STGs	National Formulary Committee reviewed infectious disease sections of national STGs and published revised version in 2008
	Preservice and in-service training	University of Zambia revised undergraduate medical curricula to incorporate AMR and rational medicine use topics
		Alliance for the Prudent Use of Antibiotics Zambia chapter established, which catalyzed capacity-building training on AMR-basic research methodologies
	Media engagement	Segment on AMR and rational use aired on the weekly nationally-broadcast television series, *Your Health Matters*
	Medicine quality assurance	Strengthening of medicine quality assurance system was based on an inspection scheme involving document verification, visual inspection, and Minilab testing of drug samples at key ports of entry in Zambia
	Surveillance	Field-tested an AMR module for population-based surveys (RPM Plus, Macro International, 2008)
Ethiopia	Baseline survey	Antibacterial prophylaxis prescribed for 75.9% of surgical procedures in higher doses and for longer duration than recommendations
		Providers' adherence to STGs for pneumonia was only 19.6%
		Nearly two-thirds of patients surveyed thought that antibacterials could effectively treat watery diarrhea and the common cold
	National AMR strategy	National Strategic Framework for the Prevention and Containment of AMR in 2011, revised in 2015
	Media engagement	Conducted a skills building workshop in 2007 for journalists, spokespersons, and advocates
		FMHACA developed media engagement strategy to improve AMR coverage
		Between 2012 and 2014, 218 AMR- and rational medicine use-related broadcasts/publications in 10 languages were produced (radio (83.5%), newspapers (8.7%), and television (7.8%)
Namibia	Preservice and in-service training	Supported Ministry of Health and Social Services (MOHSS) and Pharmaceutical Society of Namibia in organising 2013 Pharmacy Week to raise AMR awareness
		University of Namibia (UNAM) School of Pharmacy integrated AMR and rational medicine use topics in undergraduate pharmacy curricula
		UNAM School of Medicine revised curricula to incorporate infection prevention and control, rational use topics
	Medication adherence	MOHSS institutionalised WHO-recommended HIV drug-resistance early warning indicators (Hong et al., 2010; Jonas et al., 2014)
		Conducted pilot of SMS medication adherence reminder system in antiretroviral treatment settings
	Infection prevention and control	MOHSS adopted the SPS Infection Control Assessment Tool as official tool to guide activities
EPN	Public awareness/media engagement	EPN developed public messaging on AMR and 10 comic strips as a vehicle for dissemination. Over 33,000 comic strips were shared across EPN's member network in 35 countries and in six languages
		EPN member in India educated 1,371 adolescents (between 14 and 18 years old) in 11 schools on the dangers of AMR, the need to use medicines correctly, and on health promotion. Pre- and post-intervention assessments indicated that their knowledge level increased from 29% to 66%
		EPN member in Togo held a workshop for prescribers and journalists to raise awareness of AMR
		EPN member in Zimbabwe trained journalists on AMR and rational medicine use resulting in media publications and broadcasts
	Surveillance	EPN member in Democratic Republic of Congo conducted a retrospective study of culture and sensitivity results over a one-year period
	Infection prevention and control	EPN member in Togo set up a waste management system for the Kpele Eleme health facility
		EPN member in Malawi improved hand washing supplies and practices in two hospitals
	Drug quality assurance	8 EPN members in Africa and 2 members in India were trained and began using Minilab to test medicine quality
	Rational prescribing	EPN members in Kenya, Tanzania, and Uganda carried out interventions to increase prescribing adherence to STGs; post-intervention assessments showed improvements

veterinary and agriculture sectors. Each of the four coalitions also issued respective call-to-action documents to guide future advocacy and action against AMR. One coalition, EPN, has gone on to adopt an updated version of its call-to-action document in an effort to maintain momentum and relevance in its actions against AMR.

A notable difference in the approach was the source of the coalition leadership, which arose from different entities. As mentioned, in Zambia, a voluntary group endorsed by the government led the coalition's activities. In Ethiopia, activities were led by a task force situated within the national drug regulatory authority and in Namibia by stakeholders from academia and the Ministry of Health. EPN leadership promoted and coordinated activities within its network of faith-based pharmaceutical organisations.

The coalitions were able to organise AMR containment activities at multiple levels and to forge a variety of partnerships and sub-coalitions to support their action plans. For example, the AMR stakeholders at the University of Namibia collaborated with the Ministry of Health stakeholders to revise preservice curricula within their School of Pharmacy. A partnership was also developed with the Medicines Utilisation Research in Africa group to study and promote sustainable and rational medicine use.

The long-term sustainability experiences varied. In Ethiopia, the coalition was formed as a government task force and was successful in developing a national AMR strategy in 2011 that helped to sustain commitment and support for AMR. The task force began implementing AMR-related activities in accordance with its strategy and has since published a revision to ensure these efforts continue to move forward (Ethiopia Food, Medicine, and Healthcare Administration and Control Authority, 2015). The group also grew to encompass stakeholders from other sectors including agricultural and animal health. Additionally, following the initial 2008 kick-off meeting, EPN worked to sustain their AMR-related efforts by successfully diversifying their funding with support from multiple partners (Action on Antibiotic Resistance, Bread for the World, Difaem, Misereor, SPS, and SIAPS). EPN further cemented AMR in its mission by including it as an organisation priority in the EPN 2016 to 2020 strategic plan.

Based on local assessments or perceived priorities, the coalitions focused on locally relevant activities or actions – for example, Zambia and Namibia worked to revise STGs and health professionals' preservice training curricula. Interestingly, three of the four coalitions determined that media engagement was a major priority area, and two coalitions implemented activities in the area of infection prevention and control. Through its network of partner organisations, EPN implemented more than 140 AMR-related activities following its first regional AMR workshop in 2008, including hosting multiple workshops for media and other AMR stakeholders to raise awareness, generating public messaging and materials, and educating more than 1,300 students in India on the challenge of AMR.

Lessons learned

WHO published the Global Strategy for Containment of AMR in 2001, the Global Action Plan in 2015, and a manual in 2016 to help support countries in developing national action plans that are aligned with the Global Action Plan (WHO, 2001, 2015b, 2016). The 2014 Global Health Security Agenda partnership (2017) also supports the development and implementation of national action plans through its AMR Action Package. However, most countries have yet to develop or finalise comprehensive national plans to fight AMR (Sumpradit et al., 2017; WHO, 2015a). Only when governments and other stakeholders identify AMR as an urgent priority can they make policy decisions related to drug regulation, antimicrobial use in humans and animals, infection control, and AMR surveillance, education, and research. Through the implementation of this work, several lessons learned and future recommendations have emerged.

Providing initial support for multidisciplinary stakeholder engagement can jump-start coalition action

Because AMR is an issue that affects and is affected by many different types of stakeholders, it is often beyond the scope of any one organisation to mobilise all stakeholders around the issue. Working with local organisations and institutions, we brought together additional stakeholders from different disciplines and sectors who were then able to generate a shared vision, foster the coalition's development, and mount organised local and regional advocacy and action against AMR. For example, bringing together stakeholders in Ethiopia triggered the coalition's institutionalisation within Ethiopia's regulatory authority and facilitated the development of a national strategy that paved the way for strategic action against AMR. The initial momentum from a kick-off meeting is especially effective for a core group to engage additional parties to contribute to coalition action, and core groups are most effective when they include influential opinion leaders and change agents to support the execution of activities with coalition partners. During implementation, core groups were most effective when they acted as the partner coordinators rather than serving as the sole implementer of AMR-related activities.

Coalition-building can be effective at all levels and with different types of organisations leading the process

The four coalitions, although built using the same principles, had different sizes, structures, and leadership. In Zambia, a small voluntary core working group emerged to lead the coalition. In Ethiopia, the coalition developed as a task force situated within the government; whereas in Namibia, leaders from universities brought the issues to the forefront.

Building on existing mechanisms, structures, and groups when possible helps to integrate AMR as a value-add rather than a competing priority

The complex nature of AMR makes it too expansive for one organisation to comprehensively address alone. However, in some instances, groups such as professional associations, government working groups, or private-sector organisations, may be well positioned to take a lead on AMR as part of their mandates and potentially lead a coalition. EPN's pre-existing network of faith-based pharmaceutical organisations and professionals was a structure that naturally lent itself to including AMR as a valuable addition to its other priorities. EPN leadership then successfully brought about action by providing information, motivation, and technical support to its network of members.

Considering the local context helps coalitions be effective from the start

Our experiences showed that although many of the drivers of AMR and potential areas of action are similar across countries or regions, a solid, evidence-based understanding of their own situation drives individual coalition activities. This evidence also helps diverse coalitions with members who have varying opinions to remain focused on data-driven, locally relevant activities. In Ethiopia, for example, evidence showing that low level of patient knowledge on AMR was a major area of concern. This finding led the coalition to implement a major media skills-building and awareness-raising campaign to improve the quality and number of stories on AMR. Similarly, in Zambia, the situational analysis revealed low health provider awareness of and compliance with STGs, which prompted the AMR Advocacy Working Group to support the Ministry of Health to update and disseminate new versions of the STGs and conduct advocacy and training workshops. However, even in cases where local data on AMR are few or weak, the coalition does not have to wait to initiate immediate advocacy and actions, because abundant global recommendations on the causes and

containment of AMR are available to warrant immediate local action. The coalition can then identify local priorities and research activities that they can incorporate into their action plans.

Advocacy serves as a foundation for coalition action

When these four coalitions were first formed, major efforts to inform both coalition members and outside groups on AMR was critical. These initial advocacy efforts helped to create an enabling environment that supported further coalition activities. Raising awareness of AMR became such an important priority for the coalitions, that Ethiopia, Zambia, and EPN added advocacy – primarily through increased media engagement – to their core coalition activities. In addition, EPN updated and reissued its call-to-action document to its members to foster continued engagement and activities.

Awareness-raising and advocacy are valuable on their own, but they should be used to catalyse actions. Our experience shows that some coalition members tend to focus on advocacy alone as an end in itself; when this happens, the core working group needs to re-direct the coalition's attention toward the ultimate objective of identifying and implementing specific containment interventions.

Challenges

In addition to successes in helping to build action-oriented coalitions, we also encountered challenges that can inform future efforts. First, although kick-off meetings and call-to-action documents were effective in generating initial momentum for AMR-related actions and advocacy, sustainability resulted from the AMR coalition's institutionalisation through government action, such as Ethiopia's AMR task force, or from organisational commitment and fundraising (e.g. EPN). The coalitions that found it difficult to maintain momentum relied primarily on voluntary membership and a sole source of external funding and were not institutionalised.

Second, although the One Health strategy of collaborating across health, agriculture, and environmental sectors is now recognised as a best practice, the concept was not widespread at the time some of these coalitions were established. Since its establishment, only the Ethiopian AMR task force went on to establish formal links to the agricultural and veterinary sectors. Engagement with the environmental sector has been limited; however, our recent collaboration with stakeholders in Sierra Leone and Swaziland to develop national strategies on AMR show a trend toward supporting the One Health approach. For example, as Swaziland stakeholders drafted their *National AMR Containment Strategic Plan 2017–2021,* they deliberately included on the task team multisector representatives from the Ministry of Health, Ministry of Agriculture, Ministry of Natural Resources & Energy, and the Swaziland Environment Authority. The three ministries also participated in the stakeholders' consensus meeting and reviewed the revised strategy. The final draft's priority actions clearly delineate activities in the human health, animal health, agriculture, and environment sectors.

One Health is a powerful concept, but putting it into practice requires leadership and integrated efforts by otherwise disparate sectors working in silos with different policies and regulations. Adequate AMR-related funding and capacity-building for not only the human sector, but also the veterinary, agriculture, and environmental sectors will be critical, and effective multisectoral networking as well as coordinated policy reviews, budgets, activities, and monitoring based on a common vision will be needed to truly operationalise the One Health approach. As countries evolve their AMR strategies, they will need to incorporate multisector implementation plans and targets to assure appropriate attention to achieving One Health.

Third, although our approach emphasises M&E as a critical component, we had difficulties in establishing capacity in these settings. While some monitoring plans were developed for specific activities, plans to track coalition activities overall were not developed. Problems included weak

M&E capacity within the AMR core working groups; a dearth of local baseline data around the issue of AMR; limited resources for M&E activities; and sometimes divergence amongst multiple stakeholders on what would be critical and feasible to measure. Another challenge was insufficient existing global guidance with M&E framework and validated core indicators suitable for use in LMICs to monitor progress in containing the complex problem of AMR. The current tripartite effort by WHO, FAO, and OIE to develop an approach for monitoring and evaluation of the Global Action Plan on AMR will help address this gap.

Conclusion

Our experience with the coalition-building approach in Ethiopia, Namibia, Zambia, and with EPN shows that coalitions can form in a variety of ways with many different stakeholders (i.e. government, academia, faith-based organisations) to generate a shared vision and carry out organised actions to preserve the effectiveness of existing antimicrobials and contain AMR. Understanding and acting on the local AMR situation are critical to gain consensus on implementing appropriate interventions. Framing AMR activities as 'value added' to existing programmes is more effective and sustainable than launching them as separate and possibly competitive activities. Likewise, actions need to leverage existing initiatives and resources, but funding and action opportunities need to be diversified. AMR containment should be viewed as a continuing rather than a one-off process and should be framed as a component of an overall health systems strengthening strategy.

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