



Roundtable on WASH and AMR

15 June 2017

Building knowledge. Improving the WASH sector.

Photos on front cover:

1. Maputo, Mozambique | Joe Brown/Georgia Tech ©
2. Bucket in Health Care Facility | Giorgia Gon/Soapbox Collaborative ©
3. Tea pickers in Kenya | Neil Palmer (CIAT) ©

Acknowledgements

This report summarises discussions at a roundtable event on WASH and AMR held on 15 June 2017. We would like to thank Joanna Esteves Mills (SHARE), Sophie Durrans (SHARE) and Megan Wilson-Jones (WaterAid) for compiling this report.

Contributors



This material has been funded by UK aid from the Department for International Development (DFID). However, the views expressed do not necessarily reflect the Department's official policies.



ANTIMICROBIAL
RESISTANCE
CENTRE
*Inspiring innovation in AMR research through
interdisciplinary and international engagements*

LONDON
SCHOOL of
HYGIENE
& TROPICAL
MEDICINE



Background

The mass production and use of medicines to treat infections, alongside the intensification of agriculture and increased antimicrobial use in livestock, have resulted in a rise in antimicrobial resistance (AMR). Improved water, sanitation and hygiene (WASH) may plausibly contribute to the reduction of AMR via two important pathways. Firstly, through preventing infectious diseases, and therefore antimicrobial use and misuse. Secondly, by reducing the spread of antimicrobial resistant bacteria, resistance genes and residues through water, wastewater and sanitation in the environment.

Despite the plausible impact of WASH on AMR, little is known about the levels of human exposure to AMR via water and its health impact compared to other exposure routes, how to reduce the spread of AMR, or the ideal surveillance strategy to monitor AMR in the environment.

Microbiology has been a leading discipline in framing and understanding AMR pathways and drivers. Current emphases on risk assessment, risk management, and monitoring and surveillance draw heavily on environmental microbiology in public health. In 2015, the World Health Organisation (WHO) [held a workshop to develop a research agenda for WASH and AMR](#) that built on the May 2015 WHO Global Action Plan (GAP) on AMR. In this workshop, a three-themed framework for identifying key research needs was proposed: evidence of water as a pathway for AMR exposure; guidelines for a consistent and pragmatic approach to prevention and control; and uniform and global surveillance (1).

In June 2017, the London School of Hygiene and Tropical Medicine convened a roundtable to build on these earlier discussions around research, feasibility and funding, and the politics of WASH and AMR. The roundtable moved beyond a purely microbiological framing and considered the differential risks and patterns associated with the three domains of household and community, Health Care Facilities (HCF), and agricultural settings.

Objectives:

The roundtable aimed to further discussion on future research priorities in this area and specifically to achieve the following three objectives:

- Facilitate discussion across disciplines on what we do and don't know on WASH & AMR;
- Develop 3-4 short and longer-term priorities for future research within each of three settings of interest;
- Draft concepts for research initiatives to take priority research questions forward

Plenary presentations

Five presentations in plenary lay the groundwork for discussions by outlining the global framework for addressing AMR, summarising the state of the evidence on the effect of WASH on AMR in household and community, HCF, and agricultural settings, and providing an overview of the current funding landscape for AMR.

1. Kate Medicott, Technical Officer, WASH and Health at WHO, provided an overview of the global action plan, and the six guiding principles that underpin it. The environmental component has gained increased traction in recent years. 97 countries have national action plans on AMR, and activities that map onto these objectives include ensuring water and sanitation is included in AMR training and communication materials. Greater evidence of the impact of WASH on AMR will guide our understanding of whether current WASH service delivery efforts simply need to step up a gear to reduce the spread of AMR, or whether how programmes are conducted will need to change to better address risk factors.

Discussion focussed on the absence of good data for AMR, and the lack of capacity to collect it, in certain regions of the world. The group agreed that a comprehensive mapping of existing activity is required to ensure that future efforts complement, rather than duplicate.

2. Dr Joe Brown, Assistant Professor of Environmental Engineering at Georgia Tech School of Civil and Environmental Engineering, summarised the evidence base on impact of WASH on AMR at the household and community levels. Whilst improved WASH plausibly limits infection, the scale of the effect is unknown, and even in areas where WASH is good AMR persists. With regards exposure, the relative importance of faecal waste, water and sanitation systems as exposure routes to AMR remains unknown. Furthermore, evidence suggests the need to reevaluate existing WASH programmatic approaches. Water treatment systems may not remove trace abx residues or inactivated microbes, and evidence suggests that sanitary infrastructure actually provides opportunities for microbial communities to mix and exchange genes.

Discussion centred on the importance of drug resistant infections and associated health impacts as a starting point, and on whether attention should be paid to drugs other than antibiotics which create exposure to other chemicals in the environment that can result in AMR. i.e. antiretrovirals.

3. Giorgia Gon, Research Fellow at LSHTM/Soapbox Collaborative focused in on the current state of the evidence and persisting gaps on the impact of WASH on AMR in health care facilities. She highlighted in particular a lack of evidence around mothers, Health Care Associated Infections (HCAIs) and AMR. Currently, there are only a handful of studies on puerperal infections and AMR. She explored the challenges of Infection Prevention Control (IPC) in maternity units, highlighting the short turn-around, multiple transmission routes and behavioural aspects.

Discussion highlighted that alcohol-based hand rub is scarcely available in many settings, and usage is low. In addition, it was noted that the overlap between healthcare settings and the community centre hasn't been fully explored, and a refocus on defining solutions, rather than describing the problem is needed.

4. Professor Claire Heffernan, Director of the London international Development Centre, provided an overview of the global livestock sector, using contrasting examples from the US poultry industry and Kenya's livestock systems in an urban slum. She highlighted the difference between tame and wicked problems, and decision-makers need better support tools and access to critical data and ways to identify best practice.

5. Dr. Ghada Zoubaine, Programme Manager for Antimicrobial Resistance, Medical Research Council, summarised the funding opportunities available for AMR research. Whilst there is no single WASH funder within the research councils, challenge-led, collaborative approaches present opportunities to include WASH research. Current and upcoming calls include AMR Going Global (£10M in partnership with the Department of Health), the Joint Programming Initiative AMR and the Newton Fund.

Breakout sessions on household and community, HCFs and agriculture

Discussion followed on research priorities covering risk assessment, risk management and monitoring & surveillance within each of the three domains of interest.

Household and community

The discussion centred on two broad questions, which together could inform the decisions of policy-makers and funders in how much AMR-focused resources to dedicate to WASH: 1. What is the scale of the burden of AMR that can be associated with inadequate WASH? 2. What interventions will deliver the greatest impact in reducing the WASH-related burden of AMR?

With regards question 1, three main priorities were identified. In the short-term, the group agreed that looking specifically at the WASH-associated burden of drug-resistant infections offers a good starting point, given the more tangible nature of cases of treatment failure. Another avenue where quick gains might be possible is in estimating the WASH attributable portion of antibiotic use drawing on existing data on diarrhoeal disease aetiologies and associated antibiotic use. A longer-term priority would be to undertake a detailed characterisation of WASH and AMR more broadly. One approach would be to hone in on areas where it is emerging comparatively fast and map possible risk factors and determinants, including WASH related factors.

In terms of identifying effective interventions, the value of support tools in aiding decision-making that is context-relevant whilst concrete answers are still emerging was voiced. The importance of evaluating existing interventions such as CLTS and critically

assessing the relative merits of on-site versus city-wide treatment systems, was also discussed. Emerging research in Maputo suggests that people with bigger infrastructure have higher levels of AMR. Finally, the group prioritised research that adopts a historical perspective to emphasise the critical value of prevention, including through WASH, as a crucial component to tackling AMR.

Healthcare facilities

The discussion on healthcare facilities focused on three research themes; 1) understanding the burden of Healthcare Associated Infections (HCIs) and AMR organisms in healthcare settings; 2) examining the relative importance of multi-drug resistant organism transmission routes in healthcare settings related to WASH; and 3) determining which WASH and IPC interventions will have the greatest impact on reducing the burden of HCIs and AMR in healthcare settings.

A systematic review number of studies, along with a proposal to the Cochrane review, is currently underway to better understand and quantify the burden of HCIs in relation to WASH, however the lack of data especially in low and middle income settings was highlighted as a key ongoing challenge.

Much of the discussion focused on the question of understanding the routes of transmission of micro-organisms within different HCF healthcare settings, beyond identifying the micro-organisms but examining the source of infection and the drivers of transmission. This was identified as the initial research priority since understanding transmission routes will be critical to direct which aspects of WASH should be prioritised, including both infrastructure elements and behaviours. It was also highlighted that the research could consider examining the link between transmission routes within healthcare settings HCFs and the impact on the wider community.

Agriculture

The discussion centred on three topics: livestock, aquaculture and horticulture (including vegetables, markets, gardening, citrus industry and manure). Much of this discussion focussed on aquaculture, which has been poorly studied in LMICs in relation to WASH and AMR. Water came across as the key issue, and surface water was identified as a potential area for future research, in addition to polluted water more generally. The risk of peri-urban sewage waste treatment water for aquaculture or horticulture and its relationship with AMR was also identified as an area that could benefit from further research.

A key priority identified is to understand the knowledge farmers have, and how they manage the interface between antibiotic use and water stewardship, which would require both quantitative and qualitative research. Another priority is to identify emerging crisis points, such as the transition from semi-commercial to commercial farming. In the broader discussion with the wider group, several additional points emerged, in relation to wastewater in biosolids,

Closing remarks: WASH & AMR from a policy perspective

Guy Howard, Team Leader of DFID's UK WASH Policy Team, summed up the day with some reflections from a policy perspective. First, he highlighted the critical importance of a robust research agenda on WASH and AMR to guide donor investment and policy decisions going forward. WASH and AMR is a priority for the UK Government, but there is a critical need to move beyond plausibility of effect to concrete evidence on the impact of WASH on AMR and effective interventions. Second, he emphasised the particular relevance of outcomes that affect the human population - for example drug-resistant infections - in driving the AMR agenda from a policy-perspective. Finally, he underlined the need for different emphasis across different settings. For example, for HCFs the argument for targeting the issue of AMR is clearer than in the household and community domain, where the level of risk is as yet less defined.

Next steps

The discussion emerging from this roundtable has been shared with relevant research, policy and practice communities to inform the future direction of work on AMR and the environment. In particular, it has fed into the WHO-led Global Action Plan for AMR, and has informed proposals to the United Kingdom Medical Research Council's call in July 2017 for proposals on AMR in a global context.

Participant list

| Name | Organisation |
|------------------------|--|
| Arabella Hayter | WASH in Health Care Facilities, WHO |
| Dr. Clare Chandler | Associate Professor in Medical Anthropology & Director of AMR Centre, LSHTM |
| Prof. Claire Heffernan | Director, London International Development Centre |
| Claire Kilpatrick | Consultant to WHO Service Delivery and Safety - Infection Prevention and Control Global Unit |
| Dr. Garance Upham | Vice-President, World Alliance Against AMR |
| Dr. Ghada Zoubiane | Programme Manager on AMR, Medical Research Council |
| Giorgia Gon | Research Fellow in Epidemiology, LSHTM |
| Dr. Guy Howard | WASH Team Leader, DFID |
| Yael Velleman | Senior Policy Analyst on Health and Sanitation, WaterAid |

| | |
|------------------------|--|
| Dr. Gwen Knight | Research Fellow, NIHR Health Protection Research Unit in Healthcare Associated Infections and AMR, Imperial College London |
| Dr. Clare Chandler | Associate Professor in Medical Anthropology & Director of AMR Centre, LSHTM |
| Joanna Esteves Mills | Policy Research Manager, SHARE Consortium, LSHTM |
| Dr. Joe Brown | Assistant Professor of Environmental Engineering, Georgia Tech School of Civil & Environmental Engineering |
| Dr. John Manton | Head of Humanities and Environmental Sciences, AMR Centre & Assistant Professor in Public Health and Policy, LSHTM |
| Julie Storr | Consultant to Infection Prevention and Control Global Unit & Quality Systems and Resilience Unit, WHO |
| Kate Medicott | Technical Officer, Water, Sanitation, Hygiene and Health, WHO |
| Dr. Lena Ciric | Lecturer in Environmental Engineering, University College London |
| Megan Wilson-Jones | Policy Analyst on Health and Hygiene, WaterAid |
| Oliver Cumming | Assistant Professor of Environmental Health, LSHTM |
| Dr. Richard Stabler | Associate Professor in Molecular Bacteriology & Director of AMR Centre, LSHTM |
| Prof. Sandy Cairncross | Professor of Environmental Health, LSHTM |
| Dr. Shahida Syed | Research and Science Project Coordinator, Global AMR Innovation Fund project, Global Health Security Programme, UK Department of Health |
| Prof Sirajul Islam | Emeritus Professor, International Centre for Diarrhoeal Disease Research, Bangladesh |
| Sophie Durrans | Research Uptake Officer, SHARE Consortium, LSHTM |
| Dr. Alan Tollervey | Team Leader, Agriculture Research, Research and Evidence Division, DFID |
| Dr. Willem van Schaik | Professor of Microbiology and Infection and Royal Society Wolfson Research Merit Fellow, Institute of Microbiology and Infection, University of Birmingham |