Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report - PRACTICES

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Broom, A.	Antibiotic optimisation in 'the bush': Local know-how and core-periphery relations	Health Place	2017	Australia	Human	Hospital	Interview study	Antimicrobial practice is deeply embedded in experiences of being on the geographical periphery, and at the periphery of (established) knowledge. Health, place, and biographies intersect and shape how clinicians manage infections and perceive the problem of resistance.	Strategies of 'antibiotic optimisation' must be embedded in an understanding of the importance and complexity of the locale they aim to regulate.	https://doi.org/10.1016/j.healthplace.2017.09.003
Broom, A.	The private life of medicine: accounting for antibiotics in the 'for-profit' hospital setting	Soc Theory & Health	2018	Australia	Human	Hospital	Interview study	In private hospitals, the economic context and infection management intersect to produce institutional and relational pressures, and an implicit set of obligations in the privatised environment. These revolve around reputational and economic pressures for the private hospital as a business entity; external issues related to the funding of acceptable practices driven by private insurers; and, consumerist obligations to the patient.	Market-driven forces create a distinct set of obligations that could undermine the local and global antibiotic optimisation agenda. Given the increasingly privatised landscape of healthcare, exploring the nexus of economics and practice will be vital in retaining antibiotics for the future.	https://doi.org/10.1057/s41285-018-0063-8
Broom, A.	Antimicrobial Resistance, Politics, and Practice in India.	Qual Health	2020	India	Human	Hospital & community / primary care	Interview study	The social dimensions of AMR in India cut across unregulated environs, multiple markets, competing expert systems and unique, localized conditions. They are set against the background of socioeconomic vulnerabilities. These situated accounts of practice offer considerable insight into the complex web of potential economic, cultural, organizational, and political "factors" which may be fundamental to the production and reproduction of practices complicit in the acceleration of AMR.	Our findings offer broader context to reframe resistance in India as multifactorial, enacted through cultural/local practices, and irreducible to singular problems of control or regulation	https://doi.org/10.1177/1049732320919088

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – PRACTICES (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Broom, J.	The drivers of antimicrobial use across institutions, stakeholders and economic settings: a paradigm shift is required for effective optimization	J Antimicrob Chemother	2019	Australia	Human	Hospital	Interview study	Social relationships and institutional structures have a strong influence on antimicrobial use. These include the influence of personal risk, hierarchies, inter- and intra-professional dynamics and sense of futility in making a difference long term in relation to antimicrobial resistance. Influential institutional structures include patient population factors (including socioeconomic factors, geographical isolation and local infection patterns), proximity and resource issues	Antimicrobial optimization has tended to emphasize individual 'behaviour improvement' in prescribing. A paradigm shift is urgently needed to incorporate personal, interpersonal and institutional variables.	https://doi.org/10.1093/jac/dkz233
Buller, H.	Veterinary Diagnostic Practice and the Use of Rapid Tests in Antimicrobial Stewardship on UK Livestock Farms	Front Vet Sci	2020	United Kingdom	Animal	Intensive farming	Interview study	Diagnosis, as a practice, is both a scientific and a social process, lying at the very center of medical and veterinary activity and professional legitimacy. Rapid or point-of-care tests are not seen by UK farm animal veterinarians, at least at the current time, as the critical panacea for antimicrobial use reduction across all production sectors	The growing availability of rapid and point-of-care tests effectively diversifies the range of diagnostic actors with consequences for the flow of diagnostic and disease information, rather than replacing them.	https://doi.org/10.3389/fvets.2020.569545
Charani, E.	The Differences in Antibiotic Decision-making Between Acute Surgical and Acute Medical Teams: An Ethnographic Study of Culture and Team Dynamics	Clin Infect Dis	2018	United Kingdom	Human	Hospital	Ethnographic study	Different medical specialties have their own language, behaviors, social norms, and values. In medicine teams, the legacy of infection diagnosis made in the emergency department determines antibiotic decision-making. In surgery, antibiotic decision-making is perceived as a nonsurgical intervention that can be delegated to junior staff or other specialties. This results in defensive antibiotic decision-making, leading to prolonged and inappropriate antibiotic use.	Colleagues with expertise in antibiotics should engage and communicate with surgeons in a way that accommodates their working patterns and their preferred platform (phone, text messaging); Define a dedicated clinical role for antibiotic stewardship within the surgical team who has responsibility for ensuring appropriate antibiotic management for their team's patients; Target stewardship interventions in the first 48 hours after admission to rationalize antibiotics started; Have a clinical pharmacist as part of medical ward rounds will assist with appropriate antibiotic use.	https://doi.org/10.1093/cid/ciy844

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – PRACTICES (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Charani, E.	Investigating the cultural and contextual determinants of antimicrobial stewardship programmes across low-, middle- and high-income countries—A qualitative study	PLoS One	2019	Burkina Faso, France, Norway, India, United Kingdom	Human	Hospital	Ethnographic study	Antimicrobial stewardship programmes were restricted by professional boundaries and hierarchies, with lack of engagement with the wider healthcare workforce. The surgical specialty was identified as most difficult to engage with in each country. At the macro level government and state infrastructures determine antimicrobial stewardship programmes.	There needs to be promotion of interdisciplinary team work including pharmacists and nurses, (depending on the available healthcare workforce) including through local leadership/ antimicrobial stewardship champions. Contextually driven programmes targeting the surgical pathway in different resource settings need to be developed. Legislation and investment in resources to support local Antimicrobial stewardship programmes are needed. However too much government involvement can disrupt such efforts and cause redirection of limited resources.	https://doi.org/10.1371/journal.pone.0209847
Charani, E.	Antibiotic Stewardship-Twenty Years in the Making.	Antibiotics (Basel)	2019	Multiple countries	Human	Hospital & community / primary care	Review	Antibiotic decision-making is a social process dependent on cultural and contextual factors. Cultural boundaries in healthcare and across specialties limit the involvement of allied healthcare professionals in stewardship interventions. The cultural differences between specialties and healthcare professionals shape the shared knowledge within and across specialties in the patient pathway, resulting in variation in care.	Bespoke stewardship interventions that account for contextual variation in practice are necessary. Globally, resources remain a limiting factor antibiotic stewardship program implementation.	https://doi.org/10.3390/antibiotics8010007
Charoenboon, N.	Translating antimicrobial resistance: a case study of context and consequences of antibiotic-related communication in three northern Thai villages	Palgrave Commun	2019	Thailand	Human	Community/ primary care	Case study	Participants aligned their antibiotic-related attitudes and behaviours with the activity's recommendation, However, fragmented local healthcare landscapes limited villagers' ability to act on the activity but also provided a market opportunity for informal antibiotics sales, and interactions with parallel yet misunderstood public health campaigns created rumours and resistance.	Comprehensive mixed-method evaluations of future campaigns with mandatory two directional knowledge exchange components are needed. Popular overuse of antibiotics may only be the symptom of a larger problem of precarious living conditions and lacking social support, which could not be rectified with health policy interventions alone.	https://doi.org/10.1057/s41599-019-0226-9

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Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Chauhan, A.	The social biography of antibiotic use in smallholder dairy farms in India	Antimicrob Resist Infect Control	2019	India	Animal	Smallholders	Interview study	Smallholding dairy farmers operated within very small margins of profits. The paucity of formal veterinary services at the community level, coupled with easy availability of antibiotics and the need to ensure profits and minimise losses, promoted non-prescribed antibiotic consumption. In the presence of weak veterinary care infrastructures with limited outreach activities, severe human resource limitations, poor legislative and regulatory oversight, and limited knowledge and awareness of the role of antibiotics in consumers, it will be difficult to combat the issue of emergent antibiotic resistance	Interventions such as community awareness programmes related to veterinary antibiotics, establishing an effective drug distribution policy, imposing penalties on defaulters, and strengthening of veterinary human resources both in terms of quantity as well as competence is required to address the issue adequately.	https://doi.org/10.1186/s13756-018-0354-9
Chen, M.	Prescribing Antibiotics in Rural China: The Influence of Capital on Clinical Realities	Front. Sociol.	2020	China	Human	Community/ primary care	Interview study	The demands of both practitioners' and patients' social, cultural, and economic forms of capital help to explain patterns of antibiotic prescribing. Official regulations and institutional pressures to generate revenues, informants' desire to maintain good relations with patients coupled with their concerns for patient safety result in tensions between their professional knowledge of "rational" antibiotic and their practices.	Cultural and economic forms of capital as particularly salient in this setting and thereby offer a valuable and original perspective for better understanding the sociocultural factors impacting clinician antibiotic prescribing practices.	https://doi.org/10.3389/fsoc.2020.00066

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – PRACTICES (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Cooke, P.	What is 'antimicrobial resistance'; and why should anyone make films about it? Using 'participatory video' to advocate for community-led change in public health.	New Cinemas	2020	Nepal	Human	Community/ primary care	Case study	We examine the world-view presented in the films this project generated. We consider the complexity of the power relationships at work in these films, which, in turn, allow us to reflect on the *processes* at work in in participatory film making and AMR awareness raising activities.	Participatory video could be used as a tool for developing community-level solutions to AMR	https://doi.org/10.1386/ncin_00006_1
Davis, M.	Understanding media publics and the antimicrobial resistance crisis	Glob Public Health	2017	Multiple countries	Human	Community/ primary care	Review	We consider the challenge of communicating about antimicrobial resistance in light of 'media publics', including: the tendency of health communications to cast experts and lay individuals in opposition; the blaming of individuals who appear to 'resist' expert advice; the challenges presented by negative stories of AMR and their circulation in public life, and; the problems of public trust tied to the construction and mediation of expert knowledge on the effective management of antimicrobial resistance.	Public policy and communications that appreciate the complexities of biomedicalised social worlds can enhance public communications on AMR. They can assist public health systems to construct more effective interventions that account for the complex mediation of the antimicrobial message, and address unintended consequences such as the amplification of social inequality and the erosion of public trust.	https://doi.org/10.1080/17441692.2017.1336248

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – PRACTICES (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Davis, M.	Willy nilly' doctors, bad patients, and resistant bodies in general public explanations of antimicrobial resistance	Sociol Health Illn	2020	Australia	Human	Community/ primary care	Interview study	Publics rely on a heavily inscribed understanding of the body defending itself against microbes. They also read antibiotic misuse and overuse messages as the responsibility of other patients and medical practitioners, and not themselves. Significantly, the scientific world view that has created expert knowledge about AMR hails publics in ways that discredits them and limits their capacity to take action.	Increased engagement with publics will be required to ensure that collaborative and sustainable AMR approaches are fashioned for the future. These approaches would address the social worlds of the general public, working with their expertise to co-produce the tools they need to safely address AMR and develop hybrid lay/ expert knowledge for antibiotics and AMR, better fitted to the real world circumstances. This would have the benefit of stepping away from a deficit model of publics and the discrediting of lay world views, by collaborating with them in terms that are workable in the myriad social settings in which infections arise and need treatment.	https://doi.org/10.1111/1467-9566.13111
Haenssgen, M.	Antibiotics and activity spaces: protocol of an exploratory study of behaviour, marginalisation and knowledge diffusion	BMJ Glob Health	2018	Thailand, Laos	Human	Community/ primary care	Protocol paper	Microlevel data on treatment seeking behaviour can contribute an understanding of behaviour beyond awareness and free choice, highlighting, for example, decision-making constraints, problems of marginalisation and lacking access to healthcare and competing ideas about desirable behaviour	The activity space framework can help conceptualise and situate people's antibiotic access and use during illness	https://doi.org/10.1136/bmjgh-2017-000621
Haenssgen, M.	The Consequences of AMR Education and Awareness Raising: Outputs, Outcomes, and Behavioural Impacts of an Antibiotic-Related Educational Activity in Lao PDR	Antibiotics (Basel)	2018	Laos	Human	Community/ primary care	Quantitative analysis	Before and after survey data around the implementation of an AMR educational activity. Activity-related communication circulated among more privileged groups, which limited its indirect effects. Among participants, the educational activity influenced the awareness and understanding of "drug resistance", whereas the effects on attitudes were minor. The evidence on the behavioural impacts was sparse and mixed, but the range of possible consequences included a disproportionate uptake of antibiotics from formal healthcare providers	Our study casts doubt on the continued dominance of awareness raising as a behavioural tool to address antibiotic resistance. Widespread poverty and the generally low access to public healthcare, even in our peri-urban setting, suggest that solutions to problematic forms of antibiotic use do not necessarily reside in the domain of awareness raising, but rather in more fundamental areas like access to healthcare and medicine.	https://doi.org/10.3390/antibiotics7040095

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Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Haenssgen, M.	The social role of C-reactive protein point-of-care testing to guide antibiotic prescription in Northern Thailand	Soc Sci Med	2018	Thailand	Human	Community/ primary care	Case study	We find widespread positive attitudes towards the test among patients and healthcare workers. Healthcare workers use the test to support their negotiations with patients but also to legitimise ethical decisions in an increasingly restrictive antibiotic policy environment.	More research is needed to ascertain effects on prescription behaviour, distributional implications on different groups of patients, and how the policy environment and healthcare practices, local perceptions of illness and medicine, and a broader set of contextual and structural factors influence the nature, effectiveness, and usefulness of point-of-care testing	https://doi.org/10.1016/j.socscimed.2018.02.018
Haenssgen, M.	Antibiotic knowledge, attitudes and practices: new insights from cross-sectional rural health behaviour surveys in low-income and middle-income South-East Asia	BMJ Open	2019	Thailand, Laos	Human	Community/ primary care	Quantitative analysis	A cross-sectional health behaviour survey of rural populations. Villagers were aware of antibiotics and drug resistance but the usage of technical concepts for antibiotics was dwarfed by local expressions like 'anti-inflammatory medicine'	Locally specific conceptions and counterintuitive practices around antimicrobials can complicate AMR communication efforts and entail unforeseen consequences. Overcoming 'knowledge deficits' alone will therefore be insufficient for global AMR behaviour change. An expansion of behavioural AMR strategies towards 'AMR-sensitive interventions' that address context-specific upstream drivers of antimicrobial use (eg, unemployment insurance) and complement education and awareness campaigns are needed.	https://doi.org/10.1136/bmjopen-2018-028224
Haenssgen, M.	How context can impact clinical trials: a multi-country qualitative case study comparison of diagnostic biomarker test interventions	Trials	2019	Vietnam, Thailand, Myanmar (Burma)	Human	Community/ primary care	Interview study	Part of a trial evaluating the introduction of CRP point of care testing. Perceived infectious disease risks, health system factors, and the demand-side context influenced adherence of health care workers and patients to the test results. The disease focus of the trial did not correspond closely with expectations about antibiotic treatment among doctors and patient. Language and popular conceptions of illness emerged as an important pointer for contradictions between implicit assumptions of the intervention and local realities. Our case study was a further example of tension between internationally recommended guidelines for disease management and local health systems	If interventions fail to appreciate the local context, they risk duplicating other solutions, competing with existing practices, or producing unintended consequences.	https://doi.org/10.1186/s13063-019-3215-9

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Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Helliwell, R.	Can resistant infections be perceptible in UK dairy farming?	Palgrave Commun	2019	United Kingdom	Animal	Intensive farming	Ethnographic study	Farmers and vet, when observing instances of treatment failure, draw on an experiential repertoire that foregrounds the complexities of host-pathogen interaction, or failings in human behaviour, over pathogen-antibiotic interactions. The knowledge-practices of both farmers and vets, although adept at identifying and diagnosing infectious disease are not equipped to make resistance perceptible which has implications for antibiotic use, Veterinarians anticipate resistance when making antibiotic choices. However, because of the absence of farm level knowledge of resistance this anticipatory logic is informed through the prevalence of resistance 'at large'.	The current national surveillance regime is potentially inadequate and identifies a need to establish an active farm-based surveillance regime. Equally, if the knowledge it produces is responsive to the needs of practitioners and can be usefully synthesised within on-farm decision making, particularly the practices of anticipation demonstrated by vets, then there is potential to re-shape the boundaries of what is known about AMR infections on farms.	https://doi.org/10.1057/s41599-019-0220-2
Jamie, K.	The Social and Material Life of Antimicrobial Clay: Exploring Antimicrobial Resistance, Medicines' Materiality, and Medicines Optimization	Front Sociol	2020	Multiple countries	Human	Community/ primary care	Theoretical contribution	Natural antimicrobials, such as plants, honey and clay, are increasingly moving into mainstream antimicrobial research. Alongside this biomedical focus, we suggest that the social and material lives of these antimicrobial materials require attention to (i) highlight the ways they have been, and continue to be, used in diverse cultures globally, (ii) explore ways we might theorize these materials within wider AMR debates, and (iii) examine the impact of antimicrobials' materiality on their use by patients	Many of the questions at the center of natural antimicrobials (e.g., the nature of the stuff itself, its movement into biomedicine and its commercial value) are shared across disciplines and best addressed through collaborative approaches. Networks spanning social, biological physical, and earth sciences to promote a holistic approach to social and material life. should be developed.	https://doi.org/10.3389/fsoc.2020.00026

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Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Khine-Zaw, Y.	A Comparison of Patients' Local Conceptions of Illness and Medicines in the Context of C-Reactive Protein Biomarker Testing in Chiang Rai and Yangon	Am J Trop Med Hyg	2018	Myanmar (Burma), Thailand	Human	Community/ primary care	Interview study	A qualitative study, part of a trial evaluating the introduction of CRP point of care testing. Testing interacted with fever patients' pre-existing conceptions of illness and medicines, their treatment-seeking behaviour, and their health-care experiences, which led to new interpretations of the test, unforeseen exclusion patterns, implications for patients' self-assessed illness severity, and an increase formal health-care facilities status. The mismatch between local illness conceptions and inbuilt assumptions of clinical interventions can potentially reproduce problematic equity patterns	Recognising the diagnostic process extends beyond the point of care technology, implementers may consider applying the test after clinical examination to validate rather than direct prescription processes.	https://doi.org/10.4269/ajtmh.17-0906
King, R.	A process for developing a sustainable and scalable approach to community engagement: community dialogue approach for addressing the drivers of antibiotic resistance in Bangladesh	BMC Public Health	2020	Bangladesh	Human	Community/ primary care	Case study	A community engagement intervention was co-produced and was explicitly designed to link into existing health system and community structures, and be appropriate for the cultural context. It has the potential to be implemented at scale. We anticipate that taking this approach increases local ownership, as well as the likelihood that the intervention will be sustainable and scalable.	Community engagement interventions should ensure that a range of stakeholders coproduce the intervention, and that the intervention is designed to be appropriate for the health system, community and cultural context.	https://doi.org/10.1186/s12889-020-09033-5

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Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Kirby, E.	Medical authority, managerial power and political will: A Bourdieusian analysis of antibiotics in the hospital.	Health (London)	2018	Australia	Human	Hospital	Interview study	We explore hospital managers; accounts of responding to antimicrobial resistance, managing antibiotic governance and negotiating clinical and managerial priorities. Managers' accounts articulate the problematic nexus of measurement and accountability, the downflow effects of political will, and core tensions within the hospital between moral, managerial and medical authority.	Antibiotic use optimisation will necessitate a degree of jurisdictional re-negotiation between managers and doctors within which competing forms of capital within the hospital will feature prominently. Addressing antibiotic use requires an acknowledgement that neither doctors nor managers have absolute power and are rather caught in an ongoing negotiation of capital and authority.	https://doi.org/10.1177/1363459317715775
Krockow, E.	The international dimensions of antimicrobial resistance: Contextual factors shape distinct ethical challenges in South Africa, Sri Lanka and the United Kingdom	Bioethics	2018	South Africa, Sri Lanka, United Kingdom	Human	Hospital	Interview study	Structural and cultural contexts impact on the prominence of different ethical dimensions of the antimicrobial resistance dilemma which involves balancing apparently opposed interests of current and future patients. These dimensions are the visibility and moral equality of future generations; Rule of Rescue; prescribing autonomy and conflicts of interest; and consensus on collective action. In the private sectors, economic incentives can substitute for morally and ethically based solutions,	A nuanced understanding of national prescribing dilemmas is critical to inform the design of effective stewardship approaches. Engaging doctors in collective efforts to preserve antimicrobial efficacy needs to be balanced, particularly in low- and middle-income countries, by supporting them to optimize their prescribing without significantly increasing immediate mortality risks. Economic incentives and sanctions in the private setting need to line up with collective goals for the conservation of antimicrobial efficacy	https://doi.org/10.1111/bioe.12604

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Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Krockow, E.	Balancing the risks to individual and society: a systematic review and synthesis of qualitative research on antibiotic prescribing behaviour in hospitals	J Hosp Infect	2019	Multiple countries	Human	Hospital	Review	Systematic review of qualitative research (34 studies, 6 from LMICs). The Health Belief Model was used as an analytic framework. The abstract and long-term consequences of AMR led physicians to doubt personal susceptibility. While they believed in the benefits of optimizing prescribing, the direct link between over-prescribing and AMR was questioned. Changing their behaviour was considered futile when fighting this complex problem. The salience of individual patient risks was a key barrier to more conservative prescribing. Physicians perceived broad-spectrum antibiotics to be effective and low risk; it involved low cognitive demand and enabled physicians to manage patient expectations. Antibiotic prescribing decisions in low-income countries were shaped by heightened uncertainty and risk due to poor microbiology and infection control services	Consider ways through which the perception of the risk of AMR can be made more immediate. Develop evidence show that interventions to optimize prescribing are effective in slowing the spread of resistance. Feedback on prescribing patterns may foster a recognition of personal responsibility. Consider how to make visible, and reward, conservative prescribing, and how to manage the risk associated with decisions not to prescribe; for example, through organizational protection from personal litigation. In LMICS, new technology to support improved diagnostic testing and the provision of microbiology services will reduce diagnostic uncertainty. Improved access to expert support from microbiology services and pharmacists will also help. In LMICs, a more complex approach is needed with any interventions for behavioural change accompanied by a tightening of antibiotic sales regulations and improvements of general hygiene levels	https://doi.org/10.1016/j.jhin.2018.08.007
Lambert, H.	Antimicrobial resistance, inflammatory responses: a comparative analysis of pathogenicities, knowledge hybrids and the semantics of antibiotic use	Palgrave Commun	2019	China	Human	Community/ primary care	Ethnographic study	Patterns of antibiotic use are the result of sociocultural, economic and systems drivers within a medical context that draws on precepts from both biomedicine and Chinese medical knowledge. E.g. systems incentives and payment arrangements within the healthcare systems, the desire for fast treatment by agricultural workers who cannot afford time off work or grandparents who need to care for grandchildren.	The focus on individual behaviour change should be complemented by greater attention to dynamic and collective processes of knowledge acquisition, the contingent and plural nature of scientific knowledge, and the semantic and sociocultural, economic and systems influences that shape the actions of health professionals, patients and publics alike.	https://doi.org/10.1057/s41599-019-0293-y

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Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Langford, B.	Cognitive bias: how understanding its impact on antibiotic prescribing decisions can help advance antimicrobial stewardship	JAC Antimicrob Resist	2020	Multiple countries	Human	Hospital	Review	Cognitive biases can contribute to suboptimal antibiotic prescribing. Common cognitive biases in antibiotic prescribing included hyperbolic discounting (the tendency to favour small immediate benefits over larger more distant benefits) and commission bias (the tendency towards action over inaction).	Management of cognitive bias includes encouraging more mindful decision making (e.g., time-outs, checklists), improving awareness of one's own biases (i.e., meta-cognition), and designing an environment that facilitates safe and accurate decision making (e.g., decision support tools, nudges). A basic understanding of cognitive biases inspire more creative strategies to ensure antibiotics are used more safely and more effectively in our patients.	https://doi.org/10.1093/jacamr/dlaa107
Lohm, D.	Role crisis, risk and trust in Australian general public narratives about antibiotic use and antimicrobial resistance	Health, Risk & Society	2020	Australia	Human	Community/ primary care	Interview study	The participants expressed their desire to act in a responsible manner. However, there was considerable confusion. Despite the encouragement of personal responsibility for health decisions, sick individuals are urged to abdicate personal decision-making powers and invests trust in the expertise of prescribers. This assumption is disrupted by 1) patients' contingencies when circumstances force them to seek and use antibiotics despite their misgivings, 2) patients' own embodied knowledge and assessment of their vulnerability and 3) doubts in the expert knowledge of clinicians. Accordingly, lay publics are left entangled in contrary expectations of responsibility and trust regarding the use of antibiotics.	Antimicrobial stewardship focusses predominantly on limiting the use of antibiotic treatments to only those cases where their effectiveness is certain and to safeguarding that they are only used as explicitly directed by medical practitioners. Such strategies may, on the surface, appear to be simple and unproblematic yet our findings suggest that there are complex reasons why such a policy may face difficulties in implementation.	https://doi.org/10.1080/13698575.2020.1783436

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Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Lorencatto, F.	Driving sustainable change in antimicrobial prescribing practice: how can social and behavioural sciences help	J Antimicrob Chemother	2018	Multiple countries	Human	Hospital & community / primary care	Review	We discuss four areas where the behavioural and social sciences can help drive more effective and sustained behaviour change in antimicrobial stewardship: (i) defining the problem in behavioural terms and understanding current behaviour in context; (ii) adopting a theory-driven, systematic approach to intervention design; (iii) investigating implementation and sustainability of interventions in practice; and (iv) maximizing learning through evidence synthesis and detailed intervention reporting.	The potential for behavioural and social sciences to contribute to antimicrobial stewardship is contingent on the urgent need for more researchers and practitioners in the field to work collaboratively across disciplines.	https://doi.org/10.1093/jac/dky222
Lucas, P.	Pathways to antibiotics in Bangladesh: A qualitative study investigating how and when households access medicine including antibiotics for humans or animals when they are ill	PLoS One	2019	Bangladesh	One Health	Community/ primary care	Interview study	Unregulated drug shops provide an essential route to medicines including those prescribed in the formal sector. Multiple and incomplete dosing were common even when prescribed by a qualified doctor. Cost was a reported barrier to purchasing full courses of antibiotics.	This work illustrates the difficulty of reducing excess use of antibiotics without restricting access. Wherever licensed suppliers are scarce and expensive, regulations which prohibit supply through unregulated drug shops risk removing access entirely for many people. The alternative is to improve their practice of drug shops.	https://doi.org/10.1371/journal.pone.0225270
Manderson, L.	Prescribing, care and resistance: antibiotic use in urban South Africa	Palgrave Commun	2020	South Africa	Human	Community/ primary care	Ethnographic study	The social context of patient and provider interactions influenced treatment. Community health centres were stretched for resources with long wait times and brief consultations. Providers' treatment decisions were informed by clinical assessment, concern about bacterial infection risk, and perceptions of patient ability to seek further care. \the provision of a prescription also reflected clinicians' appreciation of economic constraint and vulnerability.	The contextual factors that impact vulnerability and risk, including of common colds and flu, need to be addressed at multiple levels, including through structural and systems changes. However, a slow fix, that might include improvements in quality of care, working and living conditions, and hygiene and sanitation, remains a relatively distant goal.	https://doi.org/10.1057/s41599-020-00564-1

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Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
McParland, J.	What are the 'active ingredients' of interventions targeting the public's engagement with antimicrobial resistance and how might they work?	Br J Health Psychol	2018	Multiple countries	Human	Community/ primary care	Review	The analysis shows very few studies reported any explicit theoretical basis to the interventions targeting the public's engagement with AMR they described. Many interventions share common components, including core mechanisms of action and behaviour change techniques.	Few behavioural change theories have been applied in AMR interventions thus providing a clear opportunity for the development of novel interventions in this context.	https://doi.org/10.1111/bjhp.12317
Mitchell, J.	The values and principles underpinning community engagement approaches to tackling antimicrobial resistance (AMR)	Glob Health Action	2019	Multiple countries	One Health	Community/ primary care	Multidisciplinary analysis	Seven *values* underpinning the application of Community Engagement approaches to the One Health challenge of antimicrobial resistance were developed: Clarity, Creativity, (being) Evidence-led, Equity, Interdisciplinarity, Sustainability and Flexibility	This tool can be used to scene-set, road map and trouble shoot the development, implementation, and evaluation of community engagement projects to address AMR and other One Health challenges.	https://doi.org/10.1080/16549716.2020.1837484
Naher, P.	What contributes to inappropriate antibiotic dispensing among qualified and unqualified healthcare providers in Bangladesh? A qualitative study	BMC Health Serv Res	2020	Bangladesh	One Health	Community/ primary care	Ethnographic study	Antibiotics were considered a medicine of power that gives quick results and works against almost all diseases. Expensive antibiotics were considered the most powerful medicines. Antibiotics were also seen as preventative medicines. While some providers were well informed about antibiotic resistance and its causes, others were completely unaware. Many providers mistook antibiotic resistance as the side effects of antibiotics. Despite varied knowledge, providers showed concern about antibiotic resistance but responsibility for inappropriate antibiotic use was shifted to the patients and clients including owners of livestock and animals.	Specific and targeted interventions to address AMR in Bangladesh should include educational messages on the rational use of antibiotics and how they work, targeting all types of healthcare providers. While tailored training for providers may increase understanding of antibiotic action and improve practices, more far reaching structural changes are required to influence and increase responsibility for optimising antibiotic dispensing among all healthcare practitioners.	https://doi.org/10.1186/s12913-020-05512-y

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – PRACTICES (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Pearson, M.	Knowing antimicrobial resistance in practice: a multi-country qualitative study with human and animal healthcare professionals	Glob Health Action	2019	Ethiopia, India, Nigeria, Philippines, Sierra Leone, Vietnam	One Health	Community/ primary care	Ethnographic study	Contextual factors that influenced prescribing and dispensing included antibiotic accessibility and affordability; lack of local antibiotic sensitivity information; concerns over hygiene and sanitation; and interaction with medical representatives.	Increasing awareness of AMR will be insufficient to change prescribing and dispensing without local information on which antibiotics do work well, without investment in infrastructure that allows antimicrobials to be released from their 'band aid' role, and without active regulation of pharmaceutical representatives. Policy that addresses infection prevention must address the infrastructural context of hygiene if it intends to impact prescribing practices. Policy must address the need for information by local practitioners in regulatory frameworks if reliance on potentially unreliable profit orientated information sources is to be avoided. More research is needed to explore not just the role and influence of medical representatives along the antimicrobial supply chain, acknowledging the multiple levels, agendas and motivations of the pharmaceutical industry.	https://doi.org/10.1080/16549716.2019.1599560
Price, L.	Effectiveness of interventions to improve the public's antimicrobial resistance awareness and behaviours associated with prudent use of antimicrobials: a systematic review	J Antimicrob Chemother	2018	Multiple countries	Human	Community/ primary care	Review	Systematic review (19/20 studies from high income countries). The studies were heterogeneous and the quality of evidence was poor. Seventeen studies demonstrated a significant effect on changing knowledge, attitudes or the public's antimicrobial stewardship behaviours. Analysis showed that interventions targeting schoolchildren and parents have notable potential, but for the general public the picture is less clear.	The development of well-designed AMR-related interventions robustly grounded within behavioural and social science theory are needed. Well-designed, experimental studies on behavioural outcomes of such interventions are also required. We suggest that future policy makers should consider multimodal segmented population-level intervention that tailors its core messages to children, parents and the wider general public alike, particularly in high-income geographical areas	https://doi.org/10.1093/jac/dky076

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – PRACTICES (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Rodrigues, C.	Self-medication with antibiotics in Maputo, Mozambique: practices, rationales and relationships	Palgrave Commun	2020	Mozambique	Human	Community/ primary care	Ethnographic study	Antibiotics and other prescription-only pharmaceuticals were seldom used as a first resort. Practices of and attitudes towards self-medication with antibiotics are shaped by personal and socially shared experiences, articulated with forms of knowledge and information provided by different sources including relatives', neighbours' and health professionals. Health professionals, both prescribers and dispensers were influential. Situated rationales of certain consumption practices do not always follow biomedical recommendations of 'rational/appropriate use'. We need to understand and situate the rationales behind those practices, and the relational and structural factors behind such rationales.	It is important to examine the social, cultural, political and economic contingencies that may influence different antibiotic needs and modalities of use, in context and to engage with all of the different local actors to improve antibiotic use. Individuals' rationales should not be seen as part of the problem, but should rather be incorporated into the solution. We need to: improve the quality of communication in therapeutic encounters, between providers and users; adjust health campaign messages to use more contextually-significant vocabulary; adjust regulatory measures to local realities. Policy enforcement to prohibit over the counter sales in retail pharmacies need to balance restriction vs. access and to consider geographical inequalities. Regulatory measures and interventions need to consider the availability of antibiotics through illegal or informal channels, which may represent an even bigger challenge.	https://doi.org/10.1057/s41599-019-0385-8
Saukko, P.	Gaps in communication between different staff groups and older adult patients foster unnecessary antibiotic prescribing for urinary tract infections in hospitals: a qualitative translation approach	Antimicrob Resist Infect Control	2019	United Kingdom	Human	Hospital	Interview study	Inappropriate diagnosis and antibiotic prescribing in hospitals can be fuelled by gaps in communication or translation between different staff groups and older adult patients, using different languages and technologies or interpreting them differently.	Interventions to improve diagnosis and antibiotic prescribing for urinary tract infections in older adults have typically focused on educating clinicians. However, addressing gaps in communication between clinicians and patients and between different staff groups and clinical domains could importantly enhance hospital antimicrobial stewardship efforts and interventions. This could include developing advice for clinicians on how to not only recognise but also communicate with older patients about symptoms. Promoting shared understanding of the process of urinalysis between diverse staff, patients and clinical domains could also improve practices and reduce unnecessary antibiotics	https://doi.org/10.1186/s13756-019-0587-2

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – PRACTICES (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Saukko, P.	Diagnosis Between Chaos and Control: Affect and Hospital Clinicians' and Older Adult Patients' Narratives of Urinary Tract Infections"	Front. Sociol	2020	United Kingdom	Human	Hospital	Interview study	Some clinicians and patients articulated chaos narratives about being overwhelmed by contradictory evidence and events, doubting the repeated UTI diagnoses and courses of antibiotics but being unable to do anything about their concerns. Others articulated control narratives about UTIs being frequently diagnosed and antibiotics prescribed to restore patients' health, echoing certainty and security, even if the processes described typically did not follow current guidance. Our findings complicate notions of patients pressuring for antibiotics.	There is a rarely examined or acknowledged affective underlay that shapes clinicians' and patients' understandings and actions vis a vis diagnosis and antibiotic prescribing. To address this affective dimension would likely require a more conversational and cooperative approach to improving diagnosis and prescribing	https://doi.org/10.3389/fsoc.2020.00057
Snively-Martinez, A.	Ethnographic Decision Modeling to Understand Smallholder Antibiotic Use for Poultry in Guatemala	Medical Anthropology	2019	Guatemala	Animal	Smallholders	Ethnographic study	There is little access to professional vets and veterinary medications, local farm and feed shops fill the role of professional vet care and are often the only interface for rural farmers' information regarding vet medicines. Remote communities have limited access to even feed shops that sell OTC veterinary medications. Smallholder households, rely on information from neighbors and local storeowners regarding poultry treatment. If they feel there is a need to administer biomedicines to their poultry, they commonly resort to purchasing human antibiotics, which are occasionally miraculous and are widely available at local pharmacies and shops.	Access to veterinary medicine and education campaigns on poultry health are necessary to support the appropriate use of antimicrobials for backyard poultry	https://doi.org/10.1080/0145974X.2018.1550755
Tarrant, C.	Optimizing antibiotic prescribing: collective approaches to managing: a common-pool resource	Clin Microbiol Infect	2019	Multiple countries	Human	Hospital	Review	A narrative review of literature on interventions to promote the conservation of resources in social dilemmas. The social dilemma of antibiotic over-use is complicated by the lack of visibility and imminence of AMR, a loose coupling between individual actions and the outcome of AMR, and the agency relationships inherent in the prescriber role.	A theory base for future interventions seeking to shifting prescriber behaviour and promoting a focus on the collectively desirable outcome of conservation of antibiotic efficacy is provided: (1) establish clearly defined boundaries and access rights; (2) raise the visibility and imminence of the problem; (3) enable collective choice arrangements; (4) conduct behaviour-based monitoring; (5) use social and reputational incentives and sanctions; (6) address misalignment of goals and incentives; and (7) provide conflict resolution mechanisms.	https://doi.org/10.1016/j.cmi.2019.03.008

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – PRACTICES (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Thompson, W.	Clinician and Patient Factors Influencing Treatment Decisions: Ethnographic Study of Antibiotic Prescribing and Operative Procedures in Out-of-Hours and General Dental Practices.	Antibiotics	2020	United Kingdom	Human	Community/ primary care	Ethnographic study	Beliefs about antibiotics, goals for the appointment and access to dental services were important for both dentists and patients. Dentist factors included beliefs about the lifetime impact of urgent dental procedures on patients. Patient factors included their communication and negotiation skills. Contextual elements included dentists' concerns about inflicting pain on regular patients; and patients' difficulties accessing care in out of hours.	This improved understanding of factors influencing shared decisions about treatments presents significant opportunity for new, evidence-based, contextually sensitive antibiotic stewardship interventions. "one size fits all" approach to antibiotic stewardship is unlikely to be successful. Access to primary and secondary care dental services was found to be an important environmental factor impacting on both dentists and patients. Significant opportunities exist for the design of new evidence-based, theory-informed contextually fit approaches to tackle unnecessary antibiotic use	https://doi.org/10.3390/antibiotics9090575
Wang, X.	Determinants of non-prescription antibiotic dispensing in Chinese community pharmacies from socio-ecological and health system perspectives	Soc Sci Med	2020	China	Human	Community/ primary care	Interview study	Non-prescription antibiotic dispensing was driven by fierce competition between community pharmacies and by customers' expectations. At the institutional level, community pharmacies to evades the Food and Drug Administration's supervision by obtaining unsupervised and fake prescriptions, refusing to give customers sale receipts, and hiding their antibiotic supplies and sale records. At the policy level, the low cost of violating the prescription only antibiotic sale regulation and poor FDA supervision facilitated non-prescription antibiotic dispensing	Proposed interventions to reduce non-prescription antibiotic dispensing are: education campaigns to increase awareness about the risks of self-medication with antibiotics among the general public, recognizable standardize prescriptions for customers to fill their prescriptions in community pharmacies, regulations on Internet and private clinic doctors' antibiotic prescribing behaviors, electronic tracking and tracing system to purchases and sales data of antibiotics and other prescription drugs, increasing cost of violating the prescription only regulations for antibiotics sales	https://doi.org/10.1016/j.socscimed.2020.113035

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – PRACTICES (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Whittaker, A.	Investigating Understandings of Antibiotics and Antimicrobial Resistance in Diverse Ethnic Communities in Australia: Findings from a Qualitative Study	Antibiotics (Basel)	2019	Australia	Human	Community/ primary care	Interview study	There was poor understanding of antimicrobial resistance. Causes of the increasing incidence of AMR were attributed to: weather fluctuations and climate change; a lack of environmental cleanliness; and the arrival of new migrant groups. Antibiotics were viewed as 'strong' medicines that could potentially disrupt this balance and weaken the body. Travel back to countries of origin sometimes involved the use of medical services and informants noted that some imported antibiotics from overseas. Most used the internet and social media to source health information. There is a lack of information in their own languages	More attention needs to be given to migrant communities who are vulnerable to the development, transmission and infection with resistant bacteria to inform future intervention. Public health AMR messages require a sensitivity to the role of cultural diversity in understandings and practices regarding antimicrobial use. A multidisciplinary evidence base on AMR – including sociology and anthropology - which takes into account the context of pharmaceutical usage, social relationships involved in their use and the experiences and knowledges of diverse communities will assist health practitioners and policy makers to design and deliver targeted education campaigns, community-led peer interventions and regulations that can improve decision making about antimicrobial stewardship by all members of our communities	https://doi.org/10.3390/antibiotics8030135
Will, C.	From universal frames to collective experimentation? Pursuing serious conversations about antimicrobial resistance	Wellcome Open Res	2020	Multiple countries	Human	Hospital & community / primary care	Discourse / documentary analysis	Analysis of the Wellcome Trust's report: "Reframing resistance: How to communicate about antimicrobial resistance effectively". We locate the Wellcome Trust's report in the field of social science work on AMR. Writing against the backdrop of the COVID-19, we explore how AMR raises questions about our attachment to modern medicine, about the motivating value appeals to vulnerability and health inequality.	If we want to improve communication of AMR to policy makers and to different lay constituencies, we should engage with the multiplicity of stakes in and experiences of antibiotic use to find ways of sparking curiosity and emotional engagement. In particular much of the difficult politics of AMR is missed if we do not pay attention to either industrial production or inequality and vulnerability. Policy focussed recommendations should continue to develop in discussion with social scientific and bioethics work, and social scientists and bioethicists should endeavour to publish in ways that are accessible and understandable to non-academic audiences. The multiplicity of AMR meanings and practices should open up a platform for communicators to also be multiple in their metaphors, frames and imaginings of bacteria and its mechanisms of resistance	https://doi.org/10.12688/wellcomeopenres.16135.1

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – PRACTICES (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Will, C.	The problem and the productivity of ignorance: public health campaigns on antibiotic stewardship.	Soc Rev	2020	United Kingdom	Human	Community/ primary care	Discourse / documentary analysis	This article describes efforts to engage people with the issue of AMR. It analyses how public health workers encourage what they understand as responsible antibiotic use or antibiotic stewardship, and how their efforts are shaped by different theories of 'behaviour' or social action. Different versions of the citizen jostle for attention in a public health that draws on sociology, psychology, and increasingly behavioural economics. I suggest the term 'shrug' as a provocative counterpart to the 'nudge' of behavioural economics, drawing attention to the ways in which behavioural interventions may be linked to strategic retreats from engagement.	Narrow forms of behavioural thinking shape relations between governments and their citizens. For example, uses of ignorance reduce the space for other kinds of public engagement around AMR. Alternative approaches should be considered.	https://doi.org/10.1177/0038026119887330
Zhou, L.	Pathways to optimising antibiotic use in rural China: identifying key determinants in community and clinical settings, a mixed methods study protocol.	BMJ Open	2020	China	Human	Community/ primary care	Protocol paper	This study will document key drivers of, and patient pathways leading to, antibiotic use and establish the feasibility of microbiological testing and epidemiological monitoring for AMR and antibiotic use at frontline medical settings in rural China. The mixed methods approach will provide a comprehensive picture of factors influencing prescribing and sampling practices so that bias arising from any individual dataset can be accounted for in the analysis and interpretation of results strengthened through triangulation.	There is a need for comprehensive and systematic assessment of prescribing and purchasing practices in the context of China's unique health systems and policies, to identify potential targets for interventions to optimise prescribing and consumption. There are also crucial gaps in evidence regarding antibiotic resistance and its determinants in rural communities and health facilities at village and township levels in China and it is important to investigate the possibility of introducing routine monitoring of prevalence and epidemiology of AMR in these settings.	https://doi.org/10.1136/bmjopen-2018-027819

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – STRUCTURES

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Afari-Asiedu, S.	Determinants of Inappropriate Antibiotics Use in Rural Central Ghana Using a Mixed Methods Approach.	Front Public Health	2019	Ghana	Human	Community/ primary care	Mixed-methods	The qualitative component described the influence of cost of medicines on inappropriate antibiotic use. It also revealed that antibiotic users with low socioeconomic status purchased antibiotics in installments which, could facilitate inappropriate use.	To improve appropriate antibiotic use, there is the need for ministry of health and healthcare agencies in Ghana to enhance healthcare access and healthcare insurance, and to provide affordable antibiotics	https://doi.org/10.3389/fpubh.2020
Biswas, D.	An ethnographic exploration of diarrheal disease management in public hospitals in Bangladesh: From problems to solutions.	Soc Sci Med	2020	Bangladesh	Human	Hospital	Ethnographic study	Conflict between 'what should be done' and 'what can be done' was the most common challenge identified. Factors that prevented clinical guideline adherence (eg antibiotic prescription) included human resource constraints, conflicts of interests, overcrowding, and inadequate hygiene and sanitation in the emergency department and wards.	Educate doctors, nurses and medical staff using 'job aids', posters and placards. Introduce vinyl 'cholera cots' that collect waste in a bucket below the cot for those unable to use the restroom. Ensure cleaning supplies. Provide a performance-based incentive structure. Investment in sufficient weight-scales, soap, sinks, and toilets. A behavior change intervention for providers and patients on setting expectations for sanitation, hygiene and the benefits and risks of antibiotics. Expectations must be set such that guidelines can be followed yet be accommodating for the realities of resource-limitations. Reduce workload of the admitting physicians by enabling physician assistants to assess and initiate diarrheal treatment. Hiring and adequately compensating custodial staff. Develop an institutional policy on how best to engage with the pharmaceutical companies. Prescribing generic named drugs instead of brand named antibiotics may reduce cost and pharmaceutical influence. Creating policies on how to balance private and public practices.	https://doi.org/10.1016/j.socscimed.2020.113185
Blanchette, C.	Living Waste and the Labor of Toxic Health on American Factory Farms.	Med Anth Q	2019	United States of America	Animal	Intensive farming	Interview study	This article develops an ethnography of excrement by tracing the practices and knowledge of people who live and labor in proximity to late industrial lifeforms, such as confined pigs and resistance genes, and who are tasked with intimately shaping this unruly waste that has the potential to affect broader populations.	We need to address the political-economies of labour not only among human workers and the conditions of these subjects' lives, but also with the conditions of material "objects"— pigs and fecal microbes alike—that make work as it is today	https://doi.org/10.1111/maq.12491

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – STRUCTURES (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Broom, A.	Antimicrobial resistance as a problem of values? Views from three continents.	Critical Public Health.	2020	Australia, India, United Kingdom	Human	Hospital & community / primary care	Interview study	We approach the problem of AMR as one of values and culture rather than of individual behaviour. We reframe AMR as a social and political concern resulting from a confluence of factors and practices including: temporal myopia, individualisation, marketisation, and human exceptionalism	To effectively tackle AMR, we advocate solidaristic models that espouse collective responsibility and recognise relative opportunity to act. Instead of stewardship programs which are punitive at the individual level ('bad prescribers', 'good prescribers'), a systemic approach to countering AMR would direct attention to addressing the financial and reputational incentives for institutions and for the people working in them.	https://doi.org/10.1080/09581596.2020.1725444
Broom, J.	Antimicrobial overuse in India: A symptom of broader societal issues including resource limitations and financial pressures	Glob Public Health	2020	India	Human	Hospital & community / primary care	Interview study	Financial pressures, social pressures and uneven regulation all contribute to over-prescribing. Escalating antimicrobial resistance, and mortality associated with infections caused by multi-drug resistant organisms, is likely increase (appropriately) fear related to adverse patient outcomes, and make narrow spectrum prescribing increasingly difficult	Strategies to address misuse without acknowledging and addressing the critical driving forces of use will be unlikely to induce significant change. In this context, the pressures to prescribe/dispense not always diagnostic or infrastructure related, but social pressures, relating to both patient expectations and financial pressures. These may be modifiable. Considerable additional work is need to examine the social and cultural 'determinants' of AMR across India's vast and varied landscapes.	https://doi.org/10.1080/17441692.2020.1839930

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – STRUCTURES (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Chandler, C.	Current accounts of antimicrobial resistance: stabilisation, individualisation and antibiotics as infrastructure	Palgrave Commun	2019	Multiple countries	One Health	Hospital & community / primary care	Theoretical contribution	AMR presents an inversion of the current status quo rendering visible the ways in which our lives are contingent upon antimicrobial medicines: to define and deliver health care; to enable productivity of work forces, industrialisation of food other commodities; as well as making possible particular social and political values in the context of modernisation, urbanisation and globalisation. In this sense, antimicrobials can be considered as infrastructure—as usable systems that disappear unless deliberately explicated.	Recognising the infrastructural roles of antibiotics opens-up possibilities for reconfiguring AMR research and action by shifting the focus of attention across scales and enabling different forms of care, and different publics, to come into view. Such shifts enable us to conceive of AMR not only as 'The End of Modern Medicine' but as an invitation to an era of medicine beyond that defined through modernity	https://doi.org/10.1057/s41599-019-0263-4
Collingnon, P.	Anthropological and socioeconomic factors contributing to global antimicrobial resistance: a univariate and multivariable analysis	Lancet Planet Health	2018	Multiple countries	Human	Hospital & community / primary care	Quantitative analysis	Reduction of antibiotic consumption will not be sufficient to control AMR resistance because contagion-the spread of resistant strains and resistance genes-seems to be the dominant contributing factor.	Improving sanitation, increasing access to clean water, and ensuring good governance, as well as increasing public health-care expenditure and better regulating the private health sector are all necessary to reduce global antimicrobial resistance.	https://doi.org/10.1016/S2542-5196(18)30186-4
Denyer Willis, L.	Quick fix for care, productivity, hygiene and inequality: reframing the entrenched problem of antibiotic overuse	BMJ Glob Health	2019	Tanzania, Uganda	One Health	Hospital & community / primary care	Ethnographic study	This paper explores what roles antibiotics play beyond their immediate curative effects. antibiotics have become a 'quick fix' in our modern societies. They are a *quick fix for care* in fractured health systems; a *quick fix for productivity* at local and global scales, for humans, animals and crops; a *quick fix for hygiene* in settings of minimised resources; and a *quick fix for inequality* in landscapes scarred by political and economic violence.	Conceptualising antibiotic use as a 'quick fix' infrastructure shifts attention to the structural dimensions of AMR and antimicrobial use (AMU) and raises our line of sight into the longer term, generating more systemic solutions that have greater chance of achieving equitable impact.	https://doi.org/10.1136/bmjgh-2019-001590

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Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Doron, A.	The Spectre of Superbugs: Waste, Structural Violence and Antimicrobial Resistance in India.	Worldwide Waste	2020	India	Human	Community/ primary care	Theoretical contribution	We explore emerging geographies of vulnerability by examining the nexus of environmental pollution, waste-work, poverty and the decreasing viability of antimicrobials. Such spaces render poor people and their environment more exposed to infectious agents due to socio-cultural processes and environmental conditions.	Political will and tightened regulations are urgently required. Population density, poor sanitation, the magnitude of waste and scarcity of clean water mean that bacterial risk, and accompanying use of microbials, will grow and need addressing. The study of Indian conditions should be a priority to understand the development and spread of AMR.	https://doi.org/10.5334/wwwi.20
Haenssgen, M.	Precarity and clinical determinants of healthcare-seeking behaviour and antibiotic use in rural Laos and Thailand	BMJ Glob Health	2020	Thailand, Laos	Human	Community/ primary care	Quantitative analysis	The link between clinical presentation and antibiotic use was surprisingly weak. Instead, patients in precarious circumstances were significantly more likely to misuse antibiotics in the presence of situational facilitators (eg, mobile phones and social support activated during an illness).	Development processes that change whether and how people experience precarious circumstances could have unforeseen implications for collective global health threats such as AMR. Global health interventions must move beyond patient-centric and disease-centric approaches, acknowledging and responding to contextual factors that shape how people cope with illness and consider 'AMR-sensitive development policy'. If precarity as a social determinant continues to be neglected, then localised forms of hardship could unwittingly influence and undermine the effectiveness of existing clinical and behavioural interventions to tackle AMR.	https://doi.org/10.1136/bmjgh-2020-003779
Kirchhelle, C.	A Biohistorical Perspective of Typhoid and Antimicrobial Resistance.	Clin Infect Dis	2019	Multiple countries	Human	Hospital & community / primary care	Historical analysis	We reconstruct the biosocial history of AMR in the bacterium *Salmonella enterica* serovar Typhi (*S.* Typhi) showing how its evolutionary divergence was driven by rising global antibiotic use and by the neglect of typhoid outside of high-income countries. Antibiotic-intensive compensation for weak water and healthcare systems subsequently fuelled AMR selection in low- and middle-income countries but often remained invisible due to lacking surveillance capabilities.	International funding, and policy agendas extending beyond biosecurity would help foster a co-ordinated and global collective action for typhoid control.	https://doi.org/10.1093/cid/ciz556

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – STRUCTURES (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Masud, A.	Drivers of Antibiotic Use in Poultry Production in Bangladesh: Dependencies and Dynamics of a Patron-Client Relationship	Front Vet Sci	2020	Bangladesh	Animal	Smallholders	Interview study	Poultry dealers provide credit and information for small-scale poultry farmers. In return, farmers are obliged to buy poultry feed and medicine, and sell their market-ready poultry to that same dealer. Poultry dealers were the main influencers of decision-making by farmers, particularly around antibiotic use as an integral part of the production cycle risk management.	Strategies to improve antibiotic stewardship and responsible use should exploit the patron-client relationship which provides the social and information network for small-scale farmers. Regulation, monitoring, and control programs for the prudent use of antibiotics in food-producing animals must begin with feed manufacturers and small/medium-scale poultry industries	https://doi.org/10.3389/fvets.2020.00078
Rousham, E.	Human, animal and environmental contributors to antibiotic resistance in low-resource settings: integrating behavioural, epidemiological and One Health approaches	Proc Biol Sci	2020	Multiple countries	One Health	Community/ primary care	Review	A review of the extent of One Health research on antibiotic resistance. Very few studies have integrated all three components of the One Health spectrum (humans, animals and the environment) to understand the dynamics of transmission and the prevalence of community-acquired resistance in humans and animals.	Microbiological, epidemiological and social science research is needed at community and population levels across the One Health spectrum in order to fill the large gaps in knowledge of ABR in low-resource settings.	https://doi.org/10.1098/rspb.2018.0332

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – STRUCTURES (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Tarrant, C.	Moral and Contextual Dimensions of "Inappropriate" Antibiotic Prescribing in Secondary Care: A Three-Country Interview Study	Front. Sociol	2020	South Africa, Sri Lanka, United Kingdom	Human	Hospital	Interview study	Inappropriate antibiotic use is framed by prescribers not just in clinical, but also in moral and contextual terms. Prescribing decisions were seen as involving uncertainty, with prescribers having to make decisions about the threshold for appropriate use. Some drew on arguments about their duty to protect public health, while others prioritised risk avoidance for the patients in front of them, even at a cost of increased resistance. There was significant ambiguity about judgements of appropriateness of antibiotic use in case of diagnostic uncertainty. High levels of antibiotic prescribing could be seen as a rational response when prescribers were working in challenging contexts, and could be justified in relation to financial and social considerations	Rather than assuming that inappropriate prescribing can be objectively specified, more support is needed for prescribers in managing uncertainty, e.g. through approaches to support empirical decision making, improve documentation of rationale for antibiotic use, and reviews of antibiotic prescriptions (based on updated information providing more certainty, such as microbiology results). There is also a need to address the moral aspects of prescribing decisions through vignette-based debates and providing opportunities for collective input to difficult decisions. The establishment of collective agreements around the duty of prescribers to consider the interests of society in making antibiotic prescribing decisions should be considered. Efforts to reduce inappropriate antibiotic use by targeting prescribing behaviour may be futile if they fail to address local cultural and contextual conditions such as poorly integrated health systems particularly in resource limited settings. A more holistic approach should consider the broader drivers of antibiotic use including sanitation, community healthcare, and the financial implications for patients of hospitalization.	https://doi.org/10.3389/fsoc.2020.00007

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – STRUCTURES (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Tarrant, C.	Drivers of Broad-Spectrum Antibiotic Overuse across Diverse Hospital Contexts—A Qualitative Study of Prescribers in the UK, Sri Lanka and South Africa	Antibiotics (Basel)	2021	Sri Lanka, South Africa, United Kingdom	Human	Hospital	Interview study	Their features of wide coverage, effectiveness, and ease of deployment mean that broad spectrum antibiotic use becomes a simple solution to challenges arising from structural constraints and limitations. These vary across healthcare settings in countries with different health systems and levels of resource. They include structurally embedded risks and perverse incentives, social norms, missing infrastructure, and patient poverty. Social influences were most powerful in private hospital settings, where social norms around prescribing and clinical autonomy were strong drivers	Efforts to optimize antibiotic use need to go beyond correcting individual prescribing behaviour as reliance on broad spectrum antibiotics can result from local social and structural conditions that constrain the possibilities for action. Antimicrobial stewardship should include a focus on identifying alternative, contextually-sensitive, solutions to these structural issues. Structural issues may include sanitation, infection prevention policy and planning, improvements to medicines regulation, and investment in diagnostic facilities and healthcare facilities. Resolving these types of drivers requires extensive investment and regulatory and policy intervention. Other low-cost and contextually-sensitive solutions might help reduce reliance on antibiotics eg focusing microbiology resources to patient groups where they have the highest impact. It can also prompt us to ask different questions depending on the underlying drivers of overuse for example: How can we ensure that doctors feel safe and supported to reduce antibiotic use in the context of organizational priorities and national drivers around reducing mortality from infection; How might we enable doctors to attract patients and succeed in private practice through building a reputation as a responsible prescriber of antibiotics; What low-cost interventions would help reduce the risk of infection, encourage help seeking, and enable early and effective treatment in resource-poor communities; How can we design infection control interventions that are feasible in suboptimal hospital environments; How could pricing systems in private hospitals be redesigned to remove perverse incentives for using broad spectrum antibiotics?	https://doi.org/10.3390/antibiotics10010094

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – NETWORKS – Agriculture, Development and Global Health

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Begemann, S.	The Governance of UK Dairy Antibiotic Use: Industry-Led Policy in Action.	Front Vet Sci	2020	United Kingdom	Animal	Intensive farming	Ethnographic study	Dairy industry policies only partially address the complex network of people, animals, and the environment in which dairy antibiotics circulate. Antibiotic "misuse and overuse" in agriculture is far from a behavioural matter, with solely farmers and veterinarians to blame. Instead, antibiotic use in food animals is embedded in complex economic networks that constrain radical changes in dairy husbandry management and antibiotic use on farms.	Educational strategies, training programmes, and technologies that support antibiotic governance will have a limited impact in changing farmers' behaviour. More attention toward the '*needs'* of the dairy supply chain actors and wider environmental considerations is essential to reduce the dairy sector's dependency on antibiotics. Rather than contrasting lay knowledge and expert knowledge by referring to terms like rationality and irrationality, we need a collaboration between different types of antibiotic knowledges. Vision-building across sectors and disciplines to study AB-use as part of a bigger picture of animal welfare, environmental impact and sustainable food production is needed.	https://doi.org/10.3389/fvets.2020.00557
Bellet, C.	Change it or perish? Drug resistance and the dynamics of livestock farm practices.	J Rural Studies	2018	United Kingdom	Animal	Intensive farming	Interview study	Farmers prioritise farm productivity and animal health and welfare to the detriment of an adequate use of anthelmintics, which may lead to an increase in drug resistance. As a strategy to address drug resistance in livestock, mainstream policy approaches to drug management in the farm have prioritised the development and dissemination of technical guidelines. However, these guidelines are usually disconnected from the farming context, do not take into account the complexity and challenges of farm everyday practices and are eventually rejected by farmers. Farm practices related to drug use are situated within a larger context of intensive animal production systems, which themselves contribute to the emergence of animal diseases, the medicalisation of animal production and drug resistance	There is still a need for unpacking the hidden dynamics and logics of farm practices, understanding how they shape animal health management and, more specifically, drug use. This will support the development more comprehensive strategies - beyond regulations - against drug resistance. We also need to explore the roles of other players, such as the food industry and consumers, who are also responsible for defining the structures of the system and the 'value' of livestock animals, something that, ultimately, influences the emergence of diseases, the assessment of risks, the practices related to animal medication and drug resistance itself.	https://doi.org/10.1016/j.jrurstud.2018.08.016

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – NETWORKS – Agriculture, Development and Global Health (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Brazelton, M.	The production of penicillin in wartime China and Sino-American definitions of "normal" microbiology.	J Mod Chinese H	2019	China	Human	Scientific circles	Historical analysis	The history of domestic penicillin production in China during the Second Sino-Japanese War illustrates the fragility, difficulty, and historical contingency of antibiotic development.	Questions of the "normal" in biomedical research and development are more relevant than ever when it comes to the production of antibiotics. Historical analysis can help us understand how ideas of 'normal' are reached.	https://doi.org/10.1080/17535654.2019.1632563
Brives, C.	Phage therapy as a potential solution in the fight against AMR: obstacles and possible futures.	Palgrave Comm	2020	Belgium, France, Switzerland	Human	Scientific circles	Ethnographic study	Antibiotics form a kind of epistemological infrastructure, which acts as a powerful inhibitor to the development of phage therapy. In this sense antibiotics prevent the development of solutions to the problem they contribute to create.	The difficulties phage therapy faces, as highlighted can be interpreted as entrypoints for thinking of another medicine and imagining other possible futures.	https://doi.org/10.1057/s41599-020-0478-4
Brives, C.	Pluribiosis and the never-ending microgeohistories		2021	Belgium, France, Switzerland	Human	Scientific circles	Ethnographic study	Observing and learning from viruses and bacteria gives us an opportunity to understand the term *pluribiosis:* the recognition of the existence of multiple relational spectra between entities forever in the process of becoming, constantly shaped and transformed by their interactions with other living things.	The relational nature of living things is a forgotten element in antibiotic therapy. Phages help us to remember this dimension and to develop, as many agents in phage therapy hope, a medicine that actively takes into account pluribiosis.	
Brown, N.	Bugs in the blog: Immunitary moralism in antimicrobial resistance (AMR).	Soc Theory & Health	2017	United Kingdom	Human	Community/ primary care	Discourse / documentary analysis	We reveal how the moral politics of blame and immunitary othering are present in online debates about AMR, and explore the way these registers resonate with philosophical writings on the ascendency of immunitary individualism and tensions between community and immunity.	Policies focussed on behaviour, we suggest, have the potential to intensify immunitary moralism with unintended, stigmatising and socially divisive consequences.	https://doi.org/10.1057/s41285-017-0030-9

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – NETWORKS – Agriculture, Development and Global Health (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Brown, N.	Pathways, Practices and Architectures: Containing Anti-Microbial Resistance (AMR) in the Cystic Fibrosis Clinic.	Health (London)	2020	United Kingdom	Human	Hospital	Ethnographic study	This article explores AMR in the context of building design and healthcare architecture, focussing on the layout, design and ritual practices of three cystic fibrosis outpatient clinics	Most attention in policy-making and social science research envisions AMR in terms of 'behaviour'. Far less attention has been paid to the way AMR is located spatially and architecturally in a world configured socio-materially through building layout, corridors, waiting rooms, scheduling, appointment logistics, windows, air ventilation and many of the other aspects of infrastructural design	https://doi.org/10.1177%2F1363459319866894
Brown, N.	Architecture and Design for a Post-Antibiotic/Post-Covid-19 World.	Discover Society	2020	United Kingdom	Human	Hospital	Ethnographic study	AMR and Covid-19 brings back an attention to the space of the body, its situatedness, its location in structures that are social, material and physical.	A new attention to the space/atmosphere of the body, its location in the built environment, is one of most powerful assets we have when it comes to tackling infectious disease.	https://discoversociety.org/2020/0
Brown, N.	Air care: an 'aerography' of breath, buildings and bugs in the cystic fibrosis clinic.	Sociol Health Illn	2020	United Kingdom	Human	Hospital	Ethnographic study	This paper contributes to emerging 'aerographic' research on the socio-materialities of air and breath in healthcare facilities. The introduction of antibiotics changed the place of atmosphere within hospital design. Our analysis challenges the framing of AMR as a problem of human 'behaviour', showing instead how the materialities of competing 'air regimes' come into conflict with each other, thus shaping contemporary healthcare environments.	Building design is an overlooked avenue when seeking to address antibiotic use and the spread of AMR.	https://doi.org/10.1111/1467-9566.13104
Chuengsatiansup, K.	Tuberculosis in the borderlands: migrants, microbes and more-than-human borders	Palgrave Commun	2019	Thailand	Human	Community/ primary care	Ethnographic study	Combining ethnographic materials, with national policy analysis, natural history, and microbiological insights reveal the indeterminacy of borders and complex microbe-human entanglements.	Changes in the prevailing biocontainment model of infectious disease control are necessitated. We propose that disease surveillance and responses need to transcend the rigid geographic notion of space and include a more flexible topological conception of spatiality that embraces the fluidity of pharmaceuticals, microbes, and human relations.	https://doi.org/10.1057/s41599-019-0239-4

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – NETWORKS – Agriculture, Development and Global Health (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Dixon, J.	The 'Drug Bag' method: lessons from anthropological studies of antibiotic use in Africa and South-East Asia	Glob Health Action	2019	Multiple countries	One Health	Community/ primary care	Case study	The Drug Bag method produce accurate antibiotic use data as well as provide a talking point for participants to discuss antibiotic experiences. We propose it can help improve our understanding of antibiotic use in peoples' everyday lives across different contexts	This method adds to antibiotic use data collection in spaces beyond prescriber settings where data are fewest and challenging to collect.	https://doi.org/10.1080/16549716.2019.1639388
Dixon, J.	Opening up 'fever', closing down medicines	Med Anthropol Q	2019	Zimbabwe	Human	Community/ primary care	Ethnographic study	This article explores the case of the Integrated Management of Childhood Illness guideline, a periodically updated 'global' algorithm that shapes and normalises the centrality of medicines to care in low- and middle-income countries and, increasingly, the imperative to ration them. This raises the possibility that an increasingly high-tech but 'empty' form of pharmaceuticalised care is being incidentally worked into the infrastructure of weak health systems	Research that aims to configure stewardship of antimicrobials in the era of concern about AMR must attend to whether patients are categorised as targets for 'case management' or for 'care'	https://doi.org/10.17157/mat.6.4.67
Dixon, J.	Antibiotics, Rational Drug Use and the Architecture of Global Health in Zimbabwe	Soc Sci Med	2020	Zimbabwe	Human	Community/ primary care	Ethnographic study	In between individual and societal level 'drivers' of antibiotic use is an everyday articulation of care through these substances, written-in to the scripts, delivery chains and pedagogics of global healthcare. This article focuses on these everyday 'architectures' that over time and across spaces have knitted-in antibiotics and rhetorics of control that inform current responses to AMR	We propose a reconfiguring of the architecture of global health such that frontline prescribers are able to provide 'good' care without necessarily turning to antibiotics. To design-out antibiotic reliance would require attention beyond rationality, to the redrafting of blueprints that inscribe practice.	https://doi.org/10.1016/j.socscimed.2020.113594

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – NETWORKS – Agriculture, Development and Global Health (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Fortane, N.	Veterinarian 'responsibility': conflicts of definition and appropriation surrounding the public problem of antimicrobial resistance in France.	Palgrave Commun	2019	France	Animal	Intensive farming	Interview study	This article explores the controversies regarding the definition and appropriation with regard to the legitimate uses of antibiotics. Veterinarians have had to make significant compromises in order to reframe their responsibility and not lose control over the prescription and sale of antibiotics. Previously, veterinarian responsibility was conceived as a form of ownership where their authority to define the legitimate use of antibiotics was not contested; secondly, it was deemed to be a form of guilt whereby they were dispossessed of their legitimacy and capacity to act; thirdly, it was framed as a form of accountability where they were able to demonstrate their role as public health guardians	Future AMR framings could make it possible to highlight and redefine the responsibility of actors other than veterinarians alone, who remain just one link, albeit an essential one, in the global circulation of antibiotics	https://doi.org/10.1057/s41599-019-0273-2
Gradmann, C.	Re-Inventing Infectious Disease: Antibiotic Resistance and Drug Development at the Bayer Company 1945–80	Med Hist	2016	Germany	Human	Scientific circles	Historical analysis	This paper analyses how research on antibiotic resistance has been a driving force in the development of new antibiotics. Drug resistance, while being a problem for physicians and patients, offers attractive perspectives for those who research and develop new medicines. It modifies pathologies in a way that opens markets for new treatments.	Historical analysis suggest that the antibiotic discovery pipeline did not run dry. It looks more like it was abandoned.	https://doi.org/10.1017/mdh.2016.2

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – NETWORKS – Agriculture, Development and Global Health (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Gradmann, C.	From lighthouse to hothouse: hospital hygiene, antibiotics and the evolution of infectious disease, 1950–1990	HPLS	2017	Multiple countries	Human	Hospital	Historical analysis	This paper traces the evolution of infectious disease following the introduction of antibiotics to hospital medicine. It identifies three stages: the growing awareness of the hospital as a dangerous environment in the 1950s, comprehensive attempts at improving antibiotic therapy and hospital hygiene that followed from the 1960s and lastly the framing of such challenges as risk factors from the 1970s		https://doi.org/10.1007/s40656-017-0176-8
Haenssgen, M.	Tales of treatment and new perspectives for global health research on antimicrobial resistance	Med Humanit	2020	Thailand	Human	Community/ primary care	Case study	This case study illustrates the potential of medical humanities methods in public engagement to foreground cultural knowledge, personal experience and 'lay' sensemaking surrounding health systems and medicine use. Engagement activities enabled us to formulate and test locally grounded hypotheses, gain new insights into the social configuration of treatment seeking and reflect on the relationship between traditional healing and modern medicine in the context of antimicrobial resistance.	Medical-humanities-informed forms of public engagement should become a standard component of global health research, but they require extensive evaluation to assess benefits and risks comprehensively. Global health research should be framed more actively as a learning exercise and embed the agenda to 'decolonise' global health more firmly in research education and international health policy circles.	https://doi.org/10.1136/medhum-2020-011894

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – NETWORKS – Agriculture, Development and Global Health (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Hinchliffe, S.	Postcolonial Global Health, Post-Colony Microbes and Antimicrobial Resistance.	Theory, Culture & Society	2021	Multiple countries	One Health	Hospital & community / primary care	Theoretical contribution	Drug resistant infections emerge within and are intricate with the exercising of social and medical power. This framing provides a means to understand and critique current methods employed to confront the threat of widespread AMR. A global health regime that seeks to extend social and medical power, through technical and market integration, risks reproducing a form of triumphalism and exceptionalism.	An alternative approach, based on a postcolonial as well as a 'post-colony' approach to health and microbes, provides impetus to challenge the assumptions and norms of global health. It highlights the potential contribution that vernacular approaches to human and animal health can play in altering the milieu of resistance.	https://doi.org/10.1177/0263276420981606
Hinchliffe, S.	The AMR problem: demanding economies, biological margins, and co-producing alternative strategies	Palgrave Commun	2018	Bangladesh	Animal	Smallholders	Mixed-methods	In the aquatic environment and aquacultural food production, resistance drivers may relate to a variety of processes of which antibiotic use is only one. Economic and biological drivers of disease, farmer adaptations to disease risks and the potential paradox of pursuing pathogen-free food production offers a means to reduce AMR risks	Instead of limiting social science to individualised or behavioural interventions, it is necessary to embed all actors from microbes to people, to markets, within their webs of associations. The AMR problem needs to be framed as an adaptive rather than technical challenge, and involves ownership, change and experimentation across a range of relevant sites.By doing so, there is an opportunity to question approaches that continue anti-biosis by other means, and instead foster the different kinds of relationships that people have with their microbial and wider environments. Rather than see microbial surplus as a weakness, and without wanting to underplay the costs of diseases, improved food production is predicated on these microbial relations. Disease free stock needs to be made available across the production period at affordable prices.	https://doi.org/10.1057/s41599-018-0195-4

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – NETWORKS – Agriculture, Development and Global Health (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Hinchliffe, S.	Production without medicalisation: Risk practices and disease in Bangladesh aquaculture	The Geograph J	2020	Bangladesh	Animal	Smallholders	Mixed-methods	We demonstrate the importance of socio-economic and ecological conditions to any disease management strategy. A technical programme to introduce "disease-free" seed faltered partly as a result of the farmers' tendency to offset disease and livelihood risks by frequently re-stocking their ponds. Changes to seed provision were accompanied by calls to alter farmers' livestock production practices. Paradoxically, these changes exposed farmers to more intense risks, potentially locking them into unsustainable disease management practices.	Technologies like improved or disease-free seed need to be fitted to the social, economic, and ecological conditions of production. Vernacular farming practices should be considered as key assets rather than barriers to disease management strategies, and closer attention be paid to value chain and other risks as drivers of unsustainable practices If a key reason for treatment use is the desperate need to make a living within an intrinsically precarious system, then finding ecological as well as socio-economic ways to reduce rather than intensify risk-in-practice is a priority.	https://doi.org/10.1111/geoj.12371
Hobaek, B.	Less Is More: Norwegian Drug Regulation, Antibiotic Policy, and the "Need Clause"	Milbank Q	2019	Norway	Human	Hospital & community / primary care	Historical analysis	The Norwegian drug regulatory system focused on the rational use of drugs, tied closely to public health needs. When antibiotic resistance became a concern, it limited the market entry of drugs considered to promote resistance, such as combination and broad-spectrum products. This was a powerful and flexible regulatory device that also influenced drug consumption.	This historical case demonstrates how regulatory procedures can be used to limit market entrance and promote appropriate use simultaneously.	https://doi.org/10.1111/1468-0009.12405
Kirchhelle, C.	Setting the standard: multidisciplinary hallmarks for structural, equitable and tracked antibiotic policy	BMJ Glob Health	2020	Multiple countries	One Health	Hospital & community / primary care	Multidisciplinary analysis	Our multistage analysis revealed four central challenges facing current international antibiotic policy: metrics, prioritisation, implementation and inequality. In response to this diagnosis, we propose three hallmarks that can support robust international antibiotic policy.	Emerging hallmarks for good antibiotic policies are: Structural, Equitable and Tracked. To move beyond previous impasses, international policy will have to take seriously the infrastructural dimensions of antibiotic use, provide equitable solutions for communities across the globe and develop new forms of tracking progress that are multifactorial, integrated and empowering for the communities employing them	https://doi.org/10.1136/bmjgh-2020-003091

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – NETWORKS – Agriculture, Development and Global Health (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Kirchhelle, C.	Pharming Animals: A Global History of Antibiotics in Food Production (1935–2017)	Palgrave Commun	2018	Multiple countries	Animal	Intensive farming	Historical analysis	This article reconstructs the origins, global proliferation, and international regulation of agricultural antibiotics. Antibiotic concerns did not develop evenly but instead gave rise to an international patchwork of different regulatory approaches	Policymakers need to remember the long history of regulatory failures that has resulted in current antibiotic infrastructures. For effective international stewardship to develop, it is necessary to address the economic dependencies, deep-rooted notions of development, and fragmented cultural understandings of risk, which all contribute to drive global antibiotic consumption and AMR.	http://dx.doi.org/10.1057/s41599-018-0152-2
Kochhar, R.	The Virus in the Rivers: Histories and Antibiotic Afterlives of the Bacteriophage at the Sangam in Allahabad.	Notes and Records: The Royal Society Journal of the History of Science	2020	India	Human	Hospital & community / primary care	Ethnographic study	The paper explores how the bacteriophage virus comes to be spoken about within secular and sacred understandings of infection and riverine pollution, among contemporary historians, biologists and doctors, and in the city's museums. At the same time, it traces the phage in histories arcing from the ancient religious literature, to colonial disease control efforts, to today, where bacteriophages are being conceived as a potential response to the crisis of planetary AMR.	Bacteriophages are summoned as technical quick-fixes to deal with contemporary cultural malaises. Such quick-fixes, nevertheless, remain enmeshed within wider questions of historical evidence, the intimate connections between politics and nature, and the imagined roles for religion and technology in dealing with crises.	https://doi.org/10.1098/rsnr.2020.0019
Podolsky, S.	Antibiotics and the social history of the controlled clinical trial, 1950-1970.	J Hist Med Allied Sci	2010	Multiple countries	Human	Scientific circles	Historical analysis	This paper traces the interlinked histories of antibiotics, controlled clinical trials, and attempts by academics to inculcate explicitly rational therapeutics among clinicians	State approval of potential medicines to treat microbial infections is relies on evidence produced by controlled, clinical trials, a methodology developed based on evaluating antibiotics.	https://doi.org/10.1093/jhmas/jrq003

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – NETWORKS – Agriculture, Development and Global Health (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Podolsky, S.	History Teaches Us That Confronting Antibiotic Resistance Requires Stronger Global Collective Action.	J Law Med Ethics	2015	Multiple countries	One Health	Hospital & community / primary care	Historical analysis	Historical analysis highlights entrenched trends and processes, helping to frame contemporary efforts to improve antibiotic access, conservation and innovation. For example, overuse and underuse of antibiotics point to the structural and economic factors that impede the rational delivery of health care. Stewardship efforts have had to confront differing notions of therapeutic autonomy in differing states, grounded in complex relationships between doctors and their patients. Regarding antibiotics in agriculture, would-be reformers continue to confront powerful interests and lobbies.	Those who attempt to formulate a globally coordinated response to antibiotic resistance will need to confront a history of heterogeneous, often uncoordinated, and at times conflicting reform efforts, whose legacies remain apparent today.	https://doi.org/10.1111/jlme.12271
Podolsky, S.	The evolving response to antibiotic resistance (1945–2018).	Palgrave Commun	2018	Multiple countries	One Health	Hospital & community / primary care	Historical analysis	Concerns about AMR have depended on a series of linked factors: the evolution and distribution of resistant microbes; our capacity and efforts to detect such microbes; evolving models of AMR and its projected impact on medical, social, and economic futures; the linkages of antibiotic prescribing and usage to the prevailing practice and identities of the medical and veterinary professions, and to agribusiness practices; the projected capacity of biomedicine (and the pharmaceutical industry) to stay ahead of AMR; the perceived global context in which AMR and the coordination of efforts and the development of infrastructure and funding to draw attention to and confront AMR.	Much as novel antibiotic classes and compounds are to be wished for, it would be unfortunate if their successful development led to a decline in attention to larger structural factors. Concern over AMR has the potential to catalyze efforts to focus our attention on sanitation and the structures of daily living, the need for global surveillance against emerging infections more generally, and the processes underlying or preventing "rational" medical and veterinary practice.	https://doi.org/10.1057/s41599-018-0181-x

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – NETWORKS – Discourses

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Brown, N.	There is worse to come: the biopolitics of traumatism in antimicrobial resistance (AMR).	Sociol Rev	2017	United Kingdom	Human	Community/ primary care	Discourse / documentary analysis	The AMR debate has become a significant vehicle for the expression of an 'economic imaginary' where microbial resistance is projected onto the ideal operations of neoliberal markets where 'living with' the biotic weakens the market.	The economic imaginaries associated with AMR projects living against the biotic into the future. What if other kinds of futures are possible with a more cooperative juncture between humans and microbes?	https://doi.org/10.1111/1467-954X.12446
Brown, N.	Economic imaginaries of the Anti-biosis: between 'economies of resistance' and the 'resistance of economies'.	Palgrave Commun	2018	United Kingdom	Human	Community/ primary care	Discourse / documentary analysis	This paper describes the way economic principles, formulae and discourse infiltrate biological research on AMR in two key areas. In the first, 'economies of resistance', the language of market economics structures and frames microbiological explanations of bacterial resistance. The second 'resistance of economies' flows in the opposite direction from biology to economic politics: economic imaginaries of microbial life are redeployed in large-scale debates about the nature of economic life, about the future of the welfare state, industrial strategy, and about the politics of migration and race.	How we come to 'know and represent' AMR is a question of both biological and social ways of life and living. A better awareness of the consequences of how we frame AMR in terms is needed to identify the strengths and limitations in our political and economic responses.	https://doi.org/10.1057/s41599-018-0178-5
Buse, C.	Caring through distancing: spatial boundaries and proximities in the cystic fibrosis clinic.	Soc Sci Med	2020	United Kingdom	Human	Hospital	Ethnographic study	We examine how distancing can be understood as an emplaced practice of care, shaped by – and shaping - architectures and materialities in particular contexts. We explore intersections between care, risk, materialities and architectures	These findings have implications for the design of healthcare spaces, highlighting the potential of materialities and architectures for constraining or enabling practices of distancing to reduce the spread of infection	https://doi.org/10.1016/j.socscimed.2020.113531

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – NETWORKS – Discourses (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Collins, L.	Who or what has agency in the discussion of antimicrobial resistance in UK news media (2010-2015)? A transitivity analysis.	Health (London)	2018	United Kingdom	One Health	Hospital & community / primary care	Mixed-methods	Findings show that antibiotics and the infections they are designed to treat are instilled with agency, that there is a tension between allocating responsibility to either doctors-as-prescribers or patients-as-users and collectivisation of the general public as an unspecified 'we': marginalising livestock farming and pharmaceutical industry responsibilities.	The response to overuse of antibiotics needs to come at multiple levels and the media might have a role to play in promoting individual action among members of the public but there are also political and economic structures that will continue to determine who has access to antibiotics. Social representations that empower people to engage with AMR should be encouraged and disseminated.	https://doi.org/10.1177/1363459317715777
Davis, M.	A year in the public life of superbugs: News media on antimicrobial resistance and implications for health communications.	Soc Sci Med	2020	Australia	Human	Community/ primary care	Discourse / documentary analysis	AMR is a fragmented story mainly framed by scientific discovery. These stories reassure audiences that science is seeking out the means of arresting AMR and, therefore, also constructs lay publics as passive witnesses to the AMR story. This pattern of AMR story-telling furthers the social standing of science and scientists, but it also neglects deliberation on collective action, important lacunae in the social response to AMR.	Finding other ways of telling the AMR story will be vital if the role of news media is to be increased for the global effort to mitigate this challenging threat to life	https://doi.org/10.1016/j.socscimed.2020.113032
Giraud, E.	Abundance in the Anthropocene.	Soc Rev	2019	Multiple countries	Human	Community/ primary care	Theoretical contribution	We present research to bed bugs, hookworms and antibiotic resistant microbes to consider how they have become intimately entangled with particular human communities as other lifeforms have declined. We elucidate how the affordances of abundant lifeforms, including the dangers they pose to other forms of life, are entwined with failed 'technofixes', colonial legacies and contemporary inequalities.	Further ethical attention needs to be paid to finding ways of 'being alongside' life that is difficult to live with, but is becoming intimately re-entangled with human worlds	https://doi.org/10.1177/0038026119830907

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – NETWORKS – Discourses (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Greenhough, B.	Unsettling antibiosis: how might interdisciplinary researchers generate a feeling for the microbiome and to what effect?	Palgrave Commun	2018	United Kingdom	Human	Community/ primary care	Theoretical contribution	We examine how cultural, emotional and embodied responses to nonhuman others—their ability to affect 'us' humans—have implications for the ways in which public health authorities, researchers and 'lay' publics alike seek to engage with and govern nonhuman life.	Understanding and potentially generating different modes of relating to microbes—a feeling for the microbiome—offers opportunities for reconfiguring how we govern microbes and in the ways in which publics respond to perceived microbial opportunities and threats.	https://doi.org/10.1057/s41599-018-0196-3
Gröndal, H.	Harmless, friendly and lethal: antibiotic misuse in relation to the unpredictable bacterium Group A streptococcus.	Sociol Health Illn	2018	Norway	Human	Hospital & community / primary care	Discourse / documentary analysis	The article examines a medical controversy concerning guidelines for managing throat infection and antibiotic treatment. This controversy unfolds around two different ways of relating to a specific bacterium - Group A Streptococcus. The analysis shows how two understandings of human-microbial relations, are created and how different antibiotic prescribing practices are justified. It provides new insights into the relations between bacteria, humans and policy in an age of antimicrobial resistance	The definition of antibiotic misuse is unstable and policy measures aimed at reducing misuse must be related to how specific infections and bacteria are conceptualised in the actual context the policy addresses.	https://doi.org/10.1111/1467-9566.12742
Helliwell, R.	Environmental imaginaries and the environmental sciences of antimicrobial resistance.	Environment and Planning E: Nature and Space.	2020	United Kingdom	One Health	Scientific circles	Ethnographic study	We identify four imaginaries, the environmental hotspot, the pristine environment, the fluid environment and the environmental reservoir. These distinct but interconnected imaginaries produce a constellation of ideas and assumptions that shape scientific practices, the ways and places in which the environmental dimension of AMR becomes known, and the types of interventions and actions that are made apprehensible as a result	There needs to be greater social science involvement in efforts to understand and address environmental aspects of AMR. Such approaches would aim to foreground the social, economic, ecological, political and historical contingencies configuring hotspots, reservoirs, fluidity and the pristine, and perhaps in doing so shifting these idealised spaces into new localities.	https://doi.org/10.1177/2514848620950752

Appendix: Summary of the published, peer-reviewed social science studies investigating antibiotic use referred to in the preparation of the report – NETWORKS – Discourses (Cont.)

Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Irwin, R.	Imagining the postantibiotic future: the visual culture of a global health threat.	Med Humanit	2020	Sweden	Human	Community/ primary care	Discourse / documentary analysis	AMR story-telling is based around the if/then structure: if we do not take certain actions today, then we will face a postantibiotic future with certain, often catastrophic, consequences. These stories also serve to place or deflect blame, on animals, occupations, patients, industries and others and to highlight risks and consequences. While the convergence of a dominant narrative indicates scientific consensus, this consensus also stifles our collective imagination in finding new solutions to the problem.	There is need for a broader social science and humanities engagement with the visual culture of global health AMR and antibiotic use data	https://doi.org/10.1136/medhum-2020-011884
Kamenshchikova A.	Anthropocentric framings of One Health: an analysis of international antimicrobial resistance policy documents	Crit Public Health	2019	Multiple countries	One Health	Community/ primary care	Discourse / documentary analysis	Documents put human health at the centre, while the animal and environmental sectors are primarily framed as a risk for human health. Although human health is, more or less explicitly, considered to be the main problem, the animal and environmental health sectors are assigned responsibility for addressing this problem.	The discursive space shaped by one health AMR policy documents is rather narrow and would benefit from a broaden approach.	https://doi.org/10.1080/09581596.2019.1684412
Khan, M.	LMICs as reservoirs of AMR': a comparative analysis of policy discourse on antimicrobial resistance with reference to Pakistan.	Health Policy Plan	2019	Pakistan	One Health	Hospital & community / primary care	Discourse / documentary analysis	AMR was most frequently framed as a threat to human health security and economic progress, with several documents depicting LMICs as AMR 'hotspots. there was little attention to health systems, food security or access to water and sanitation more broadly in LMICS.	Conflicting narratives relevant to policymakers in Pakistan may affect policy-making and impede the development and implementation of integrated initiatives needed to tackle AMR.	https://doi.org/10.1093/heapol/czz022

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Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Lorimer, J.	Parasites, ghosts and mutualists: a relational geography of microbes for global health.	Trans Institute of British Geog	2017	Multiple countries	Human	Community/ primary care	Theoretical contribution	This paper develops a relational geography of microbes and the diseases of microbial dysbiosis. It examines three types of human–hookworm relation: the parasite, the ghost and the mutualist reflecting on the implications for the human and nonhuman subjects of global health and the microbiopolitics of prevalent forms of antibiotic and probiotic healthcare.	The current focus in global health on deworming through vaccination and drug delivery fails to address the socio-ecological drivers of infection intensity. The rise of the microbiome raises some profound challenges to the geographies of global health	https://doi.org/10.1111/tran.12189
Lorimer, J.	Hookworms Make Us Human: The Microbiome, Eco-immunology, and a Probiotic Turn in Western Health Care.	Med Anthropol Q	2019	Multiple countries	Human	Community/ primary care	Theoretical contribution	This article examines the political ecology of this probiotic turn in Western health care with the human increasingly recognised as a holobiont: composed of microbes and threatened by both microbial excess and microbial absence.	Antimicrobial approaches to germ warfare are being supplemented by probiotic approaches to restoring microbial life.	https://doi.org/10.1111/maq.12466
Morris, C.	Framing the agricultural use of antibiotics and antimicrobial resistance in UK national newspapers and the farming press	Journal of Rural Studies	2016	United Kingdom	Animal	Intensive farming	Discourse / documentary analysis	Four framings were identified: A 'system failure' frame positions intensive livestock production systems as a key contributor to AMR-related crises in human health. A 'maintaining the status quo' frame argues that there is no evidence linking antibiotics in farming to AMR in humans and stresses the necessity of (some) antibiotic use for animal health. A third frame – which is only present in the farming media – highlights a need for voluntary, industry-led action on animal antibiotic use in terms of farmer self-interest. Common to all frames is that the relationship between agricultural use of antibiotics and problems posed by AMR is mostly discussed in terms of the implications for human health.	Rather than framing the question on whether or not animal antibiotic use exacerbates problems of AMR in human medicine, the 'voluntary action' frame turns the lens back to farm systems and their own future including the capacity to continue to rely on antibiotics to prevent and treat infections. This is still a minority position, but future research might illuminate how it develops.	https://doi.org/10.1016/j.irurstud.2016.03.003

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Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Nerlich, B.	The post-antibiotic apocalypse" and the "war on superbugs": catastrophe discourse in microbiology, its rhetorical form and political function.	Public Underst Sci	2009	Multiple countries	Human	Community/ primary care	Discourse / documentary analysis	When highlighting the diminishing powers of antibiotics in the war against bacteria using the new discourse metaphor of the post-antibiotic apocalypse can be useful. It galvanizes policy makers' and funding agencies' attention, but might be less well suited when trying to change ordinary people's and ordinary policy makers' behaviour	As with climate changes, searches for different ways of framing the issue are needed.	https://doi.org/10.1177/096366250708797 4
Sarioloa, S.	Toward a Symbiotic Perspective on Public Health: Recognizing the Ambivalence of Microbes in the Anthropocene.	Microorganisms	2020	Multiple countries	Human	Hospital & community / primary care	Theoretical contribution	Antibiotics have altered microbial development by providing stringent natural selection on bacterial species. We propose a perspective on public health that recognizes microbial evolution through symbiotic associations and through lateral gene transfer. This perspective includes both the pathogenic and beneficial interactions of humans with bacteria, as well as combining the outlook of the "One Health" model with the genomic methodologies	In the Anthropocene, the conditions for microbial evolution have been altered by human interventions, and public health initiatives must recognize both the beneficial interactions of microbes with their hosts as well as their pathogenic interactions.	https://doi.org/10.3390/microorganisms8050746
Walker, I.	Beyond the military metaphor. Comparing antimicrobial resistance and the COVID-19 pandemic in the United Kingdom.	Med Anth Theory	2020	United Kingdom	Human	Community/ primary care	Discourse / documentary analysis	Military metaphors shape the limits and possibilities for conceptualising and responding to complex challenges of contagion. I draw from criticisms of the use of military metaphor in scientific and policy descriptions of antimicrobial resistance (AMR) to compare with and explore the use of military metaphors in descriptions of the COVID-19 pandemic. As AMR research has recognised the importance of symbiotic human–microbe relationships and new areas of interdisciplinary collaboration in recent years, a corresponding decline in the use of military metaphor in scientific discourse has begun to emerge	Diversity of language and imaginative framings is necessary, just as diversity of expertise is required for complex global health challenges such as AMR.	https://doi.org/10.17157/mat.7.2.806

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Lead author	Title	Journal	Year	Countries	Population	Setting	Methodology	Description of ABU	Recommendations for practice	DOI/URL
Wernli, D.	Mapping global policy discourse on antimicrobial resistance.	BMJ Glob Health	2017	Multiple countries	One Health	Hospital & community / primary care	Discourse / documentary analysis	Providing a better understanding of the competing discourses that prevail regarding AMR can support those seeking to draw attention on the problem to tailor their message to different constituencies We identify 'AMR as healthcare', 'AMR as development', 'AMR as innovation' and 'AMR as security' as frequent frames used in dealing with AMR. We found that 'AMR as One Health' constitutes a recent framing of the topic. Each frame originates in distinct scientific fields, conceptualises the main causes of AMR and prioritises different interventions and measurements	Better understanding and integration of AMR policy frames into an overarching social and ecological framework can help identify the main tensions and synergies between priorities and support policy progress in tackling AMR.	https://doi.org/10.1136/bmjgh-2017-000378