

TECHNICAL  
SERIES



**ON PRIMARY  
HEALTH CARE**

Brief

**Antimicrobial resistance  
and primary health care**

## Acknowledgements

This document was produced as part of the Technical series on primary health care on the occasion of the Global Conference on Primary Health Care under the overall direction of the Global Conference Coordination Team, led by Ed Kelley (WHO headquarters), Hans Kluge (WHO Regional Office for Europe) and Vidhya Ganesh (UNICEF). Overall technical management for the Series was provided by Shannon Barkley (Department of Service Delivery and Safety, WHO headquarters) in collaboration with Pavlos Theodorakis (Department of Health Systems and Public Health, WHO Regional Office for Europe).

This document was produced under the overall direction of Phyllida Travis and Manisha Shridhar in the WHO Regional Office for South-East Asia, and Elizabeth Tayler in the AMR Secretariat, WHO headquarters, Geneva, Switzerland, all of whom contributed valuable inputs to the paper.

The principal writing team consisted of Isabel Frost, Ramanan Laxminarayan, Nell McKenna, and Samantha Chai at the Center for Disease Dynamics, Economics & Policy, with valuable comments from Jyoti Joshi.

We also acknowledge a number of international experts for providing advice and comments: Palitha Abeykoon (Sri Lanka Medical Association, Sri Lanka); Francis Moussy (WHO, Switzerland); David Sanders (School of Public Health, University of the Western Cape, South Africa); Paul Rutter (UNICEF, South Asia); Alexandre Costa (UNICEF headquarters).

Valuable comments and suggestions were made by WHO staff, in particular Nima Asgari; Klara Tisocki; Lluís Vinyals; Sirenda Vong, from the South-East Asia Regional Office, and Benedetta Allegranzi; Raniero Guerra; Carmen Pessoa da Silva; Marc Sprenger; Lizzie Madden (WHO Consultant, Geneva).

The views expressed in this document do not necessarily represent the opinions of the individuals mentioned here or their affiliated institutions.



## Introduction

Despite the considerable improvement in global health, millions of people still lack access to quality health services, including access to effective antimicrobial medicines, or are impoverished as a result of health spending (1). At the same time, antimicrobial resistance – a consequence of overuse and misuse of antimicrobials – is increasingly a barrier to accessing effective care. The declining effectiveness of antibiotics is driven by multiple factors, many of which can be addressed through well functioning primary health care. However, primary health care has not always had much attention in national health sector responses to antimicrobial resistance, which often focus on tertiary care, laboratory detection and surveillance (2). The three pillars of primary health care (community engagement, front-line health services including primary care and essential public health, and multisectoral action on wider health determinants) are central not just to Universal Health Coverage and the Sustainable Development Goals, but also to an effective response to antimicrobial resistance.

This paper explores links between primary health care and antimicrobial resistance, and how primary health care planners, managers and providers can help address these two challenges: increasing access – especially for poor and vulnerable people – and at the same time, tackling antimicrobial resistance.



## Scale and nature of the antimicrobial resistance problem

Effective antimicrobials underpinned progress towards the United Nations Millennium Development Goals (for example, within maternal and child care, HIV, malaria and tuberculosis), and will be essential to achieving the Sustainable Development Goals (3). Rising incomes, persistent infectious diseases, easy over-the-counter access to antibiotics and lack of access to good quality primary health care are exacerbating the problem of antimicrobial resistance in low- and middle-income countries (4). Antibiotic consumption worldwide increased 65% between 2000 and 2015, and doubled in low- and middle-income countries (5). Partly as a result, drug resistance is rising and affects key populations including newborns suffering from sepsis (6) and those requiring effective antibiotics to prevent infection, for example during surgery or in transplant care or cancer treatment. This creates a conundrum: more people still die because of lack of access to antibiotics than from resistant infections, but unrestricted and inappropriate use of antibiotics will result in more infections that are untreatable, or more costly and difficult to treat (7).

Furthermore, antimicrobial resistance is linked to poverty. Very poor people are least able to afford effective antibiotics when resistance has become a problem. The World Bank estimates that antimicrobial resistance could push 28 million people into extreme poverty by 2050 (8). Inadequate water, sanitation and hygiene still contribute to the spread of infectious diseases, and the transmission of resistant infections and antibiotic residues in food and the environment. The problems of inappropriate antimicrobial use by patients and inappropriate or incomplete prescriptions by health workers are widely documented (9).

## The changing context of health and health care

Forty years after Alma-Ata, much has changed in terms of where people live, how long they live, and in their lifestyles and expectations. By 2050, a quarter of the world's population in all regions except Africa will be over 60 years old. Older people more commonly have multiple, chronic health problems such as diabetes and cancer, and are more vulnerable to infection too (10). Over half the world's population lives in urban areas, many with inadequate water and sanitation systems, which facilitate rapid disease transmission (11–14). With higher incomes, global meat consumption is increasing, and antimicrobial use in pig and poultry farming is predicted to double in line with rising demand. Antibiotic use in farming accounts for 70% of the total antibiotic consumption globally (15).

Health care has also been changing. In some countries, the majority of primary health care is provided by private practitioners and is of variable quality (16). Generic products have made antibiotics more affordable but can lead to more resistance – as happened with ciprofloxacin in Denmark (17). Lower prices may also unintentionally lead to fewer manufacturers and therefore disrupted supplies, as is the case of penicillin. Long supply chains are vulnerable to disruption, also creating shortages (18). Substandard antimicrobials increase resistance because of inadequate dosing. They also increase the unnecessary use of second-line drugs by encouraging the perception that resistance to first-line ones is widespread when the real problem is poor drug quality. A recent study by the World Health Organization (WHO) estimated that 7% of antibiotics worldwide are falsified or substandard (19). Meanwhile, technology is reshaping health care (20). Mobile applications and other new technologies are increasingly used by peripheral health workers to support health education, case detection, diagnosis and case management (21,22). These have the potential to help reinvent primary health care and improve rational antimicrobial use.

# The role of primary health care in an effective response to antimicrobial resistance

## Community-based engagement and empowerment

- Public campaigns on preventing and managing common health problems, improving water, sanitation and hygiene practices, and raising awareness about appropriate antibiotic consumption can help. This has been effective in different populations (23,24).
- Raising awareness of the dangers of self-dosing with antibiotics could help contain inappropriate use (25).
- Removing irrational fixed dosed combinations that create drug resistance, as has been done in India, can help delay resistance.
- Communities and consumers can demand animal protein from animals that are raised without antimicrobial growth promoters. This has been an important driver of change in the United States of America (26).

## Equitable access to good quality primary care services

- Many primary health facilities in low- and middle-income countries lack adequate access to water, sanitation and hygiene infrastructure, and waste management systems and practices, all of which facilitate the spread of resistant infections. Cleaner, safer health facilities help improve staff morale, quality of care and use of services, and decrease infection and consequently the need for antibiotics (27).
- Health workers are central to delivering good quality primary care services. In one study, over 80% of medical and pharmacy students incorrectly believed that antibiotics could treat influenza, and that giving antibiotics if requested by a patient constituted good patient care (28). Health workers would benefit from more training about antimicrobial resistance and good antibiotic prescribing practice –in both their preservice and in-service training.
- Drug shortages lead to the use of inappropriate antimicrobials in primary care settings (29). This can be corrected by improved supply chain management, especially in peripheral facilities (30).
- Rapid diagnostic technologies for primary care, such as rapid diagnostic tests for malaria, could improve both the accuracy of diagnosis and treatment (31).
- Many countries may have to adapt front-line services to make them more responsive to today's needs and trusted by users. This will involve a greater emphasis on quality of primary care.
- One of the reported benefits of the Integrated Management of Childhood Illness approach has been more timely, more appropriate and lower prescribing of antibiotics (32,33).

## Policies, regulation, monitoring and oversight

- Almost 60% of countries worldwide have national action plans for antimicrobial resistance, with many initially targeting antimicrobial resistance in tertiary care. These should be expanded to tackle antimicrobial resistance at the community and primary care level. The WHO approach to antibiotic use (AWaRe – Access, WAtch, REserve) is intended to balance the need to improve access while reducing the unnecessary use of second- and third-line antibiotics, and is relevant to primary care (34).
- Many countries with gaps in service coverage and health workforce shortages have introduced strategies to train more health workers, adapt training to fit today's needs, and improve retention, especially in rural areas, thereby improving access to care (35).
- Essential medicines policies and essential medicines lists, supported by supply chain management, ensure that essential medicines are available. These have been shown to improve the use of medicines, especially in low- and middle-income countries, and need to be regularly updated (36). Policies to separate drug prescribing and dispensing functions, and to restrict over-the-counter sales of prescription medicines have been effective (37,38).

- Strengthening national regulatory authorities, as is now happening in South-East Asia, will reduce the incidence of substandard and falsified antimicrobials (39).
- Improving the quality of care and prescribing behaviour of private providers, who have an important role in delivering primary care, is essential. Private providers get most of their professional therapeutic updates from pharmaceutical company representatives, who have incentives to increase sales. Continuing medical education for private providers with an emphasis on antimicrobial resistance is needed.
- Monitoring and surveillance programmes can help detect patterns of antimicrobial resistance and consumption in the community, but extrapolating from tertiary care data can be misleading. Sixty-six countries have already enrolled in the WHO Global Antimicrobial Resistance Surveillance System (GLASS) (40,41). The component in GLASS for community data needs further strengthening.

## Intersectoral action, including at the local level

- WHO's global action plan on antimicrobial resistance calls for national responses from countries to address appropriate antibiotic use as part of a one-health approach (42) that covers health care, food production and the environment. Raising awareness of antimicrobial resistance among food and agriculture stakeholders, and veterinarians, is a priority (43,44) but broader technical assistance to help local food producers phase out the use of antimicrobials in growth promotion is needed.
- The public needs to be empowered and engaged to understand the source of their food. This could be done by health professionals, including health care providers in human and animal sectors, facility managers, public health professionals or policy-makers. Community leaders and networks can help develop sustainable and feasible solutions to limit the use of antibiotics in other sectors, while ensuring that the livelihoods of farmers are protected.





## Conclusions

The Global Conference on Primary Health Care offers an opportunity to refocus global attention on primary health care and its links to universal health coverage – including universal access to effective antibiotics. Antimicrobial resistance must be tackled in tandem with the continuing evolution of health systems that are better able to deliver good quality primary health care to all people that need it without them incurring financial hardship, and are resilient and accountable. Despite the rise in noncommunicable disease, the burden of infectious disease is still substantial and constitutes a large proportion of the overall avoidable disease burden.

The contribution of primary health care to tackling antimicrobial resistance needs to be better reflected in national plans on antimicrobial resistance. In low- and middle-income countries, actions to revitalize primary health care need to include stronger systems to prevent and manage infection, both in the community and in health facilities. Community engagement and empowerment is key to effective behaviour change that can help prevent and manage common diseases without the unnecessary use of antimicrobials.

Trust in and use of primary care services can be improved by ensuring there are sufficient, appropriately skilled health workers and reliable supplies of good quality medicines and diagnostics, including first-line antimicrobials. Nongovernmental organizations and private providers must be involved in tackling the problem of antimicrobial resistance, through increased engagement with them and encouraging more appropriate use of antimicrobials. Better community-based monitoring systems are essential to track antimicrobial consumption.

Multisectoral action on antimicrobial resistance is crucial because the food and agricultural sectors use antibiotics extensively. Intersectoral action may be easier at the community level even if mandated at the national level. Working through local community leaders can help ensure that voices of affected groups, such as farmers, are taken into consideration.

Good quality, affordable primary health care is essential to improve population health and financial risk protection. The threat of antimicrobial resistance and the multifaceted response required reinforces this need.

The two interlinked challenges of increasing access to care, especially for poor and vulnerable people, at the same time as reducing antimicrobial resistance can be advanced through effective primary health care. Moreover, if antimicrobial resistance is not tackled, even the best primary health care for all risks being ineffective.



# References


1. Tracking universal health coverage: 2017 global monitoring report. Geneva: World Health Organization and International Bank for Reconstruction and Development/The World Bank; 2017 (<http://pubdocs.worldbank.org/en/193371513169798347/2017-global-monitoring-report.pdf>, accessed 17 September 2018).
2. Draft: Astana Declaration on Primary Health Care: From Alma-Ata towards Universal Health Coverage and the Sustainable Development Goals. Geneva: World Health Organization; 2018 ([http://www.who.int/primary-health/conference-phc/DRAFT\\_Declaration\\_on\\_Primary\\_Health\\_Care\\_28\\_June\\_2018.pdf](http://www.who.int/primary-health/conference-phc/DRAFT_Declaration_on_Primary_Health_Care_28_June_2018.pdf), accessed 17 September 2018).
3. United Nations. News on Millennium Development Goals (<http://www.un.org/millenniumgoals/>, accessed 17 September 2018).
4. Singh PK. A universal good: how increased health coverage can help beat back antimicrobial resistance. World Health Organization, Regional Office for South-East Asia, 2017 (<http://www.searo.who.int/mediacentre/features/2017/how-increased-health-coverage-can-help-beat-back-amr-resistance/en/>, accessed 17 September 2018).
5. Klein EY, Van Boeckel TP, Martinez EM, Pant S, Gandra S, Levin SA, et al. Global increase and geographic convergence in antibiotic consumption between 2000 and 2015. *Proc Natl Acad Sci USA*. 2018;115(15): E3463–E3470. doi: 10.1073/pnas.1717295115
6. Saha SK, Schrag SJ, El Arifeen S, Mullany LC, Shahidul Islam M, Shang N, et al. Causes and incidence of community-acquired serious infections among young children in south Asia (ANISA): an observational cohort study. *Lancet*. 2018;392(10142):145–59. doi: 10.1016/S0140-6736(18)31127-9
7. Laxminarayan R, Matsoso P, Pant S, Brower C, Røttingen JA, Klugman K, et al. Access to effective antimicrobials: a worldwide challenge. *Lancet*. 2016;387(10014):168–75. doi: 10.1016/S0140-6736(15)00474-2
8. Adeyi OO, Baris E, Jonas OB, Irwin A, Berthe FCJ, Le Gall FG, et al. Drug-resistant infections : a threat to our economic future. Final report. Washington (DC): The World Bank; 2017 (<http://documents.worldbank.org/curated/en/323311493396993758/pdf/114679-REVISED-v2-Drug-Resistant-Infections-Final-Report.pdf>, accessed 17 September 2018).
9. Laxminarayan R, Matsoso P, Pant S, Brower C, Rottingen J, Klugman K, Davies S. Access to effective antimicrobials: a worldwide challenge. *The Lancet*. 2016;387(10014):168–75. doi: 10.1016/S0140-6736(15)00474-2
10. Augustine S, Bonomo RA. Taking stock of infections and antibiotic resistance in the elderly and long-term care facilities: a survey of existing and upcoming challenges. *Eur J Microbiol Immunol (Bp)*. 2011;1(3):190–7. doi: 10.1556/EuJMI.1.2011.3.2
11. Bruinsma N, Hutchinson JM, van den Bogaard AE, Giamarellou H, Degener J, Stobberingh EE. Influence of population density on antibiotic resistance. *J Antimicrob Chemother*. 2003;51(2):385–90.
12. Alirol E, Getaz L, Stoll B, Chappuis F, Loutan L. Urbanisation and infectious diseases in a globalised world. *Lancet Infect Dis*. 2011;11(2):131–41. doi: 10.1016/S1473-3099(10)70223-1
13. World development indicators 2017. Washington DC: The World Bank; 2017 (<https://data.worldbank.org/products/wdi>, accessed 17 September 2018).
14. Araya P, Hug J, Joy G, Oshmann F, Rubinstein S. The impact of water and sanitation on diarrhoeal disease burden and over-prescription of antibiotics. London: London School of Economics and Political Science; 2016.
15. Van Boeckel TP, Brower C, Gilbert M, Grenfell BT, Levin SA, Robinson TP, et al. Global trends in antimicrobial use in food animals. *Proc Natl Acad Sci USA*. 2015;112(18):5649–54. doi: 10.1073/pnas.1503141112
16. Medicines use in primary care in developing and transitional countries. Geneva: World Health Organization; 2009 (WHO/EMP/MAR/2009.3) ([http://www.who.int/medicines/publications/primary\\_care\\_8April09.pdf?ua=1](http://www.who.int/medicines/publications/primary_care_8April09.pdf?ua=1), accessed 26 September 2018).
17. Jensen US, Muller A, Brandt CT, Frimodt-Møller N, Hammerum AM, Monnet DL. Effect of generics on price and consumption of ciprofloxacin in primary healthcare: The relationship to increasing resistance. *J Antimicrob Chemother*. 2010;65(6):1286–91. doi: 10.1093/jac/dkq093
18. Bloom G, Merrett GB, Wilkinson A, Lin V, Paulin S. Antimicrobial resistance and universal health coverage. *BMJ Glob Heal*. 2017;2(4):e000518. doi: 10.1136/bmjgh-2017-000518

- 
19. A study on the public health and socioeconomic impact of substandard and falsified medical products. Geneva: World Health Organization; 2017 (<http://www.who.int/medicines/regulation/ssffc/publications/Layout-SEstudy-WEB.pdf?ua=1>, accessed 17 September 2018).
  20. Laxminarayan R, Duse A, Wattal C, Zaidi AKM, Wertheim HFL, Sumpradit N, et al. Antibiotic resistance-the need for global solutions. *Lancet Infect Dis.* 2013;13(12):1057–98. doi: 10.1016/S1473-3099(13)70318-9
  21. PharmaDynamics. BugWise (<http://bugwise.co.za/>, accessed 17 September 2018).
  22. WHO Collaborating Centre on Patient Safety, Geneva. Evaluation of antibiotic awareness campaigns. World Health Organization; 2016 ([http://www.who.int/selection\\_medicines/committees/expert/21/applications/antibacterials-ccps\\_rev/en/](http://www.who.int/selection_medicines/committees/expert/21/applications/antibacterials-ccps_rev/en/), accessed 17 September 2018).
  23. Meadley T. Community design of hygiene promotion IEC materials. Water Week. Washington (DC): World Bank; 2003. [http://siteresources.worldbank.org/EXTWAT/Resources/4602122-1213366294492/5106220-1213366309673/9.5LaoPDRExperience-CommunityDesign\\_San\\_Hygiene.pdf](http://siteresources.worldbank.org/EXTWAT/Resources/4602122-1213366294492/5106220-1213366309673/9.5LaoPDRExperience-CommunityDesign_San_Hygiene.pdf)
  24. Sabuncu E, David J, Bernede-Bauduin C, Pepin S, Leroy M, Boelle P-Y, et al. Significant reduction of antibiotic use in the community after a nationwide campaign in France, 2002–2007. *PLoS Med.* 2009;6(6): e1000084. doi: 10.1371/journal.pmed.1000084
  25. Evidence for action on antimicrobial resistance. London: Wellcome Trust; 2016 (<https://wellcome.ac.uk/sites/default/files/evidence-for-action-on-antimicrobial-resistance-wellcome-sep16.pdf>, accessed 19 September 2018).
  26. Major food companies committed to reducing antibiotic use. PEW; 2016 (<http://www.pewtrusts.org/en/multimedia/data-visualizations/2016/major-food-companies-committed-to-reducing-antibiotic-use>, accessed 17 September 2018).
  27. World Health Organization & UNICEF. Water, sanitation and hygiene in health care facilities: status in low- and middle-income countries and way forward. Geneva: World Health Organization; 2015 ([http://apps.who.int/iris/bitstream/handle/10665/154588/9789241508476\\_eng.pdf?sequence=1&isAllowed=y](http://apps.who.int/iris/bitstream/handle/10665/154588/9789241508476_eng.pdf?sequence=1&isAllowed=y), accessed 26 September 2018).
  28. Jamshed SQ, Elkalmi R, Rajiah K, Al-Shami AK, Shamsudin SH, Siddiqui MJA, et al. Understanding of antibiotic use and resistance among final-year pharmacy and medical students: a pilot study. *J Infect Dev Ctries.* 2014;8(6):780–5. doi: 10.3855/jidc.3833
  29. Årdal C, Outtersson K, Hoffman SJ, Ghafur A, Sharland M, Ranganathan N, et al. International cooperation to improve access to and sustain effectiveness of antimicrobials. *Lancet.* 2016;387(10015):296–307. doi: 10.1016/S0140-6736(15)00470-5
  30. Kotwani A, Ewen M, Dey D, Iyer S, Lakshmi PK, Patel A, et al. Prices & availability of common medicines at six sites in India using a standard methodology. *Indian J Med Res.* 2007;125(5):645–54.
  31. World Malaria Report 2017. Geneva: World Health Organization; 2017 (<http://www.who.int/malaria/publications/world-malaria-report-2017/report/en/>, accessed 17 September 2018).



32. Black R, Laxminarayan R, Temmerman M, Walker N. Disease control priorities, Third Edition (Volume 2): reproductive, maternal, newborn, and child health. Washington (DC): The World Bank; 2016.
33. Bryce J, Gouws E, Adam T, Black RE, Schellenberg JA, Manzi F, et al. Improving quality and efficiency of facility-based child health care through Integrated Management of Childhood Illness in Tanzania. *Health Policy Plan.* 2005;20(Suppl. 1):i69-i76. doi: 10.1093/heapol/czi053
34. Sharland M, Pulcini C, Harbarth S, Zeng M, Gandra S, Mathur S, et al. Classifying antibiotics in the WHO Essential Medicines List for optimal use—be AWaRe. *Lancet Infect Dis.* 2018;18(1):18–20. doi: 10.1016/S1473-3099(17)30724-7
35. Decade for health workforce strengthening in the South-East Asia Region 2015–2024. Second review of progress, 2018. New Delhi: World Health Organization, Regional Office for South-East Asia; 2018 (<http://www.who.int/iris/handle/10665/274310>, accessed 17 September 2018).
36. Holloway KA, Henry D. WHO essential medicines policies and use in developing and transitional countries: an analysis of reported policy implementation and medicines use surveys. *PLoS Med.* 2014;11(9):e1001724. doi: 10.1371/journal.pmed.1001724
37. Park S, Soumerai SB, Adams AS, Finkelstein JA, Jang S, Ross-Degnan D. Antibiotic use following a Korean national policy to prohibit medication dispensing by physicians. *Health Policy Plan.* 2005 Sep;20(5):302–9.
38. Santa-Ana-Tellez Y, Mantel-Teeuwisse AK, Dreser A, Leufkens HGM, Wirtz VJ. Impact of over-the-counter restrictions on antibiotic consumption in Brazil and Mexico. *PLoS One.* 2013;8(10):e75550. doi: 10.1371/journal.pone.0075550
39. Delhi declaration: improving access to essential medical products in the South-East Asia Region and beyond. New Delhi: World Health Organization, Regional Office for South-East Asia; 2018 (<http://www.who.int/iris/handle/10665/274331>, accessed 17 September 2018).
40. Situational analysis on antimicrobial resistance in the South-East Asia Region: report 2016. New Delhi: World Health Organization, Regional Office for South-East Asia; 2016 (<http://apps.who.int/iris/bitstream/handle/10665/272873/AMR-2016report.pdf?sequence=1&isAllowed=y>, accessed 17 September 2018).
41. Global antimicrobial resistance surveillance system (GLASS) report: early implementation 2016–2017. Geneva: World Health Organization; 2018 (<http://apps.who.int/iris/bitstream/handle/10665/259744/9789241513449-eng.pdf?sequence=1>, accessed 26 September 2018)
42. Global action plan on antimicrobial resistance. Geneva: World Health Organization; 2015 ([http://www.who.int/drugresistance/global\\_action\\_plan/en/](http://www.who.int/drugresistance/global_action_plan/en/), accessed 17 September 2018).
43. The FAO action plan on antimicrobial resistance 2016–2020. Rome: Food and Agriculture Organization; 2016 (<http://www.fao.org/3/a-i5996e.pdf>, accessed 17 September 2018).
44. The OIE strategy on antimicrobial resistance and the prudent use of antimicrobials. Paris: World Organisation for Animal Health; 2016 ([http://www.oie.int/fileadmin/Home/eng/Media\\_Center/docs/pdf/PortailAMR/EN\\_OIE-AMRstrategy.pdf](http://www.oie.int/fileadmin/Home/eng/Media_Center/docs/pdf/PortailAMR/EN_OIE-AMRstrategy.pdf), accessed 17 September 2018).

TECHNICAL  
SERIES



**ON PRIMARY  
HEALTH CARE**