IMPLEMENTATION OF THE
GLOBAL ACTION PLAN ON
ANTIMICROBIAL RESISTANCE

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The year at a glance

In May 2015, the Sixty-eighth World Health Assembly (WHA) adopted the global action plan on antimicrobial resistance (AMR), reflecting global concern at the profound threat to human health posed by AMR. The goal of the global action plan on AMR is to ensure, for as long as possible, continuity of successful treatment and prevention of infectious diseases with effective and safe medicines that are quality-assured, used in a responsible way, and accessible to all who need them. The work for WHO that is set out in the global action plan requires contributions from many clusters at Headquarters and all regional and country offices: it also cuts across all categories in the 2016-2017 Programme Budget.

The global action plan sets out a plan of action for the world and a more limited set of actions for WHO. The key role of the WHO AMR Secretariat in Geneva is to ensure that action addressing all objectives takes place (ideally in a coordinated fashion) bearing in mind that not all activities will be carried out by WHO itself. This newsletter summarizes the activities undertaken across the Organization during the first year of implementation of the global action plan to combat antimicrobial resistance. It is gratifying to see scale up of interest and activity across a wide range of organizations. The challenge now is to ensure that this is sustained and translated into effective action where it matters most.

Marc Sprenger, Director, AMR Secretariat
The year at a glance

**Awareness raising**
- UN General Assembly high-level meeting on AMR - 193 Member States agree on action
- World Health Assembly 2016 - AMR debated in numerous sessions & side events
- Regionally (among others) - India: High-profile SE Asia Ministerial AMR conference; Govt of Japan technical consultation; RIMSA 17 Inter-Ministerial meeting Paraguay
- World Antibiotic Awareness Week multi-year campaign

**New medicines, diagnostic tools & vaccines**
- Launch of Global Antibiotic Research and Development Partnership - focus on new products for gonorrhoea & neonatal sepsis
- Global stewardship framework in development
- List of priority pathogens for new drug development in progress

**Use of antimicrobial medicines**
- New guidelines for the treatment of chlamydia, gonorrhoea and syphilis
- Launch of online reporting portal for falsified and substandard medical products
- Updating antibiotic section of WHO Model List of Essential Medicines
- Review of Critically Important Antimicrobials for human health

**Infection prevention & control (IPC)**
- Guidelines on the core components for IPC programmes developed (to be launched during World Antibiotic Awareness Week in Nov)
- Technical guideline on prevention of surgical site infections developed

**National action plans**
- Manual for developing national action plans (NAPs) and supporting tools developed
- Regional workshops to support NAP development: 51 countries and 227 participants
- 31 countries have completed NAPs
- 60 countries in process of developing NAPs

**Surveillance & research**
- 35 countries have expressed interest of which 22 are now fully enrolled
- Global expert consultation & agreement on methodology for national surveillance of antimicrobial consumption
- Framework for surveillance of antimicrobial use in development
- 1st global workshop on Strengthening Surveillance of Foodborne Diseases and AMR through Whole Genome Sequencing methods
- 2 AMR Collaborating Centres designated - Africa & Sweden
- Numerous regional activities

**WHO/FAO/OIE collaboration**
- Joint development of training materials for national action plans
- Joint development of World Antibiotic Awareness Week campaign materials
- Collaborated with World Bank 2016 report on AMR
- Common mechanism for monitoring progress in human & animal sectors in development
UN General Assembly High-Level Meeting on AMR

A year of intense awareness-raising among political leaders culminated on 21 September 2016 at the United Nations General Assembly high-level meeting on AMR. Here, world leaders signaled an unprecedented level of attention to curb the spread of infections that are resistant to antimicrobial medicines. For the first time, Heads of State committed to taking a broad, coordinated approach to address the root causes of AMR across multiple sectors, especially human health, animal health and agriculture. This was only the fourth time a health issue had been taken up by the UN General Assembly (the others were HIV, noncommunicable diseases, and Ebola).

Countries reaffirmed their commitment to develop national action plans on AMR, based on the "Global action plan on antimicrobial resistance". Leaders recognized the need for stronger systems to monitor drug-resistant infections and the volume of antimicrobials used in humans, animals, and crops, as well as increased international cooperation and funding. They pledged to strengthen regulation of antimicrobials, improve knowledge and awareness, and promote best practices — as well as to foster innovative approaches using alternatives to antimicrobials and new technologies for diagnosis and vaccines. Leaders at the UN meeting called on WHO, the Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (OIE), in collaboration with development banks such the World Bank and other relevant stakeholders, to coordinate their planning and actions and to report back to the UN General Assembly in September 2018.

Photo: Ban Ki-Moon, Secretary-General of the UN, opening the High-Level Meeting on AMR, New York, 21 Sept 2016.

WHO/FAO/OIE tripartite collaboration

Implementation of the global action plan has increased tripartite collaboration between FAO, OIE and WHO at all levels of the organizations, with regular communication at official and director level, in addition to more formal high-level meetings. These stronger relations are delivering results. In addition to the political achievements associated with the UN General Assembly process cited earlier, the tripartite has jointly developed training materials for the global action plan and staff from all three organizations have been actively engaged in the provision of training and in the development of national action plans.

World Antibiotic Awareness Week is a joint campaign utilizing all organization logos on key materials. The list of critically important antibiotics is under review by the Advisory Group on Integrated Surveillance of Antimicrobial Research (AGISAR) with FAO and OIE engagement. The three organizations have collaborated with the World Bank in the development of their 2016 report on AMR: Drug Resistant Infections: A Threat to Our Economic Future. WHO is actively collaborating with FAO and OIE on the integration of surveillance of AMR and antimicrobial use data and working on tripartite integration of monitoring mechanisms to capture Member State progress in addressing AMR in the human and animal sectors.

Tripartite work is beginning in other areas: WHO, FAO and OIE are starting to share information, collaborating on mechanisms to quantify the use of antibiotics in humans and animals; and WHO is sharing with OIE its approach to the prioritization of new vaccines. Whilst there is consensus around the importance of the animal sector in the development and spread of AMR, there is less evidence on the importance of antibiotic residues and resistant organisms in the environment. WHO will work with partners to develop a research agenda to address this.
National action plans

At the Sixty-eighth WHA in 2015, Member States committed to have national action plans (NAPs) in place by May 2017. In February 2016, WHO, in collaboration with FAO and OIE, developed a manual for developing national action plans on AMR and a set of accompanying tools. In addition to high-level meetings to generate political interest and support, workshops have been conducted in all WHO regions to share tools and support countries to develop their national action plans. FAO and OIE have been actively involved in the workshops.

To date, a total of 227 participants from 51 countries have attended these and more workshops are planned for late 2016. WHO has also supported AMR situation analyses (that underpin NAPs), as well as facilitating coordination and planning meetings. WHO is developing a roster of consultants to support this process.

Completed NAPs are now available in 31 countries and 60 countries are currently in the process of developing them. These countries are drawn from all regions, and from a growing number of lower and lower-middle income countries. It should be noted, however, that this is a rapidly evolving picture - a more definitive report will be made available to the Seventieth

WHA in May 2017. Many of the larger, strategically significant countries are making very good progress. China has recently published its NAP and plans are in progress in India, Brazil and Mexico.

Of course progress is not uniform. Some countries have had to deal with other priorities: conflict, epidemics such as Yellow Fever and Zika, etc. Getting political engagement and support has been a challenge in some countries as, although the awareness of the issue is growing and will be boosted by the UN General Assembly meeting outcome, understanding of the issue is still limited. Support to NAP development, as well as implementation, monitoring and evaluation, is likely to be an ongoing priority activity for WHO, particularly in the African and Eastern Mediterranean regions, for the next years. We welcome updates on progress, particularly from those countries where data is not yet available.

We are still learning what works best in particular contexts, and WHO is sharing expertise and developing communities of practice to support countries with ongoing efforts. Inter-sectoral action, and the complexity of coordinating within and across sectors, is a real challenge, particularly as we shift to implementation.

Raising awareness

Maintaining AMR as a priority for Member States: Over the last year WHO has organized high-level meetings in all regions, and actively engaged in high-level meetings on the issue across the globe. WHO supported the Government of India in organizing a high-profile Ministerial South-East Asia Region conference on Combating Antimicrobial Resistance: Public Health Challenges and Priority in New Delhi, India on 23-25 February 2016. Approximately 350 participants representing 16 countries joined this meeting including high-level officials and international experts from countries in the region and other regions, OIE and FAO. WHO also supported the conduct of a technical consultation hosted by the Government of Japan on 14-15 April 2016 with participation of ministries of health and agriculture from 12 countries from the South-East Asia and Western Pacific regions. In the Americas, Ministers at the 17th Inter-American Ministerial Meeting on Health and Agriculture, held in Paraguay, July 2016, under the theme of "One Health and Sustainable Development Goals", analysed veterinary public health issues including the mitigation and containment of the impact of antimicrobial resistance.

The debate on AMR at the WHA was not confined to the main session on the issue (although this was very active, with numerous country representatives speaking). It was raised very appropriately in many other debates and side events, demonstrating the extent to which it has been mainstreamed through the Organization. WHO has also raised the issue at other international meetings: EveryWomanEveryChild, Women Deliver and World Water Week.

World Antibiotic Awareness Week: WHO is leading an ongoing, multi-year antibiotic awareness campaign, ‘Antibiotics: Handle with care’. The campaign was launched during the first World Antibiotic Awareness Week, held in November 2015. The campaign aims to raise awareness and improve understanding of antibiotic resistance and promote behavioural change to reduce the further emergence and spread of antibiotic resistance. It was developed in collaboration with WHO regional offices, FAO, OIE and other partners.

WHO has developed a suite of campaign materials (infographics, videos, factsheets, posters, and a toolkit) in all UN official languages. In addition, WHO coordinated a multi-country public awareness survey on antibiotic resistance, the findings of which were released during the first World Antibiotic Awareness Week. WHO has commissioned a review, covering the past 5 years, of the key messages used in public campaigns for responsible use of antibiotics, how they were used in the campaigns and an assessment of their scientific validity.

In 2016, WHO is strengthening its partnerships and collaborating with international health professional and student groups to deliver targeted messages and reach a broader audience. It is also supporting countries to join and implement the global campaign.
**Working with health professionals:** Studies of health worker knowledge on AMR have confirmed the limited literature reports, that the knowledge of many health workers about the mechanisms of AMR, indications for antibiotics, and good prescribing is extremely limited. WHO is supporting a review of educational provision globally, with the objectives of identifying good practice and gaps, avoiding duplication and ideally developing consensus on essential curriculum elements. Surveys of health worker (and student) knowledge and practices have been carried out in the South-East Asia and Western Pacific regions.

**Surveillance and research**

**Global AMR Surveillance System:** Robust, locally relevant information is necessary for planning, prioritization, management and evaluation at country, regional and global level. WHO has launched the Global AMR Surveillance System (GLASS) with technical partners, laboratory networks and WHO Collaborating Centres around the world with the aim of filling gaps in data on AMR to inform decision-making and provide an evidence base for action. GLASS is building on existing surveillance structures and networks and provides a framework for countries to contribute surveillance data to the global system through a dedicated global IT platform that became live on 21 March 2016. Since the call for country enrolment in late March 2016, 35 countries have expressed an interest in joining GLASS and 22 of these have already completed the enrolment procedures.

Early GLASS implementation is focusing on human bacterial pathogens. An incremental extension of the system will take place over time that will link to other types of AMR-related surveillance such as the food chain, veterinary, antimicrobial use or consumption, and the environment. A selection of surveillance activities undertaken by WHO at the global, regional and country levels are given in Figures 1 and 2. Surveillance data will be used to inform the development and updating of guidelines and advocacy activities.

**Figure 1: Global integrated surveillance activities supported by WHO**
Figure 2: Regional & country level surveillance activities supported by WHO

**Regional Office for Europe:**
(i) Supporting CAESAR surveillance network, which complements EARS-Net
(ii) 1st CAESAR annual report Nov 2015
(iii) Production of five short training videos of (EUCAST) method for performing an AST
(iv) Antimicrobial consumption monitoring in 18 non-EU countries

**Regional Office for Africa:**
(i) Designated 1st WHO Collaborating Centre for AMR;
(ii) Laboratory training workshop for integrated surveillance of foodborne disease and AMR in Nairobi;
(iii) Regional training workshop for 14 countries in antimicrobial consumption survey methodology
(iv) Participated in training workshop for countries of Southern Africa, on improving the utilization of antibiotics in hospitals

**Region of the Americas**
(i) Continues its support to ReLAVRA network
(ii) Annual reports published with data from 20 Latin American countries
(iii) Alerts on emerging resistance mechanisms are published and disseminated
(iv) Ongoing external quality assurance programme
(v) Regional surveillance meeting in Panama

**Regional Office for the Western Pacific:**
(i) Supporting regional AMR surveillance by expanding the existing Japan Nosocomial Infections Surveillance (JANIS) platform for data analysis and dissemination.
(ii) Regional training workshop in antimicrobial consumption survey methodology

**Eastern Mediterranean**
Countries are considering surveillance of multi-drug resistant tuberculosis as a strong, functional model in the region and integration with GLASS is under discussion.

 provision of direct technical support, including laboratory assessments and strengthening of laboratory capacities, to the Cook Islands, Fiji, Iran, Oman, Pakistan and Samoa with the ultimate goal of these countries enrolling in GLASS.
Antimicrobial use and consumption: WHO is developing a framework for surveillance of antimicrobial prescribing and use. At the same time, work to consolidate data collection on antimicrobial consumption using national data on sales, has continued in the European region: 18 non-EU Member States are collecting data that is currently being analysed with WHO Secretariat support. The work of the European Region’s antimicrobial medicines consumption (AMC) network is being used to inform global models for data collection. The Secretariat has facilitated collaboration between researchers at the University of Copenhagen and a number of national focal points for the AMC network who are using interview studies to better understand the use of antimicrobials by doctors, pharmacists and patients. Field testing of consumption monitoring has commenced in about 20 countries in Africa and Asia with WHO providing support through training of national experts, the provision of templates and tools for data collection and analysis and related technical advice. Work is also ongoing on the review of dosing schedules of antibiotics.

Use of antimicrobial medicines in human and animal health

Responsible use of quality antimicrobial medicines in humans and food-producing animals: The antibiotic section of the WHO Model List of Essential Medicines will be reviewed and updated for the 2017 iteration. To inform this, a review and analysis of systematic reviews, meta-analysis and national guidelines for antibiotic prescribing for 20 common syndromes has been commissioned. The aim of this study is to rank the quality of evidence for antibiotic treatment of 20 common infectious disease syndromes in adults and children, in community and hospital settings and across low-, middle- and high-income countries. Following the review, evidence-based recommendations will be made to the 2017 Expert Committee on Selection and Use of Essential Medicines for the inclusion, exclusion or restriction of antibiotics on the WHO Model List of Essential Medicines

WHO is reviewing existing Clinical Practice Guidelines to see if antibiotic guidelines are linked to resistance patterns for five infectious syndromes. This ongoing work is important to understand current practice and to identify the need for further integration of resistance patterns into national guidance on antibiotic selection and use. A review of successful interventions in countries for improving prescribing and use of antibiotics is being carried out and includes stewardship models at hospital level. New guidelines for the treatment of chlamydia, gonorrhoea and syphilis were issued in August 2016.

Falsified and substandard medical products: Antimicrobials are the most frequently falsified medicines. The use of substandard and falsified antimicrobials results in inadequate treatment and can be another driver of resistance.

WHO has designed, developed and launched an on-line reporting portal for falsified and substandard medical products in three languages (English, French and Spanish). This system allows trained focal points in National Medicines Regulatory Agencies, from 113 participating WHO Member States, access to the WHO database of falsified and substandard medical products. It also provides access to training materials, alerts and a photo library of confirmed falsified and substandard medicines and vaccines. This is the only global database of its kind and is a practical and simple tool to assist Member States in reporting falsified and substandard medical products.

WHO has commissioned the development of a simple smartphone application to accelerate and improve reporting of falsified and substandard medical products from healthcare professionals to national drug regulatory authorities. The application is ready for piloting in eight countries in Africa and
Following a regional workshop on falsified and substandard medical products in Ethiopia in 2015, a number of countries, including Zimbabwe, subsequently requested national training to design their own national strategy to build capacity to prevent, detect and respond to falsified and substandard medical products.

WHO supports access to quality, affordable essential medicines in many countries worldwide, of which 20 are in Africa. The Essential Medicines and Health Products Programme provides technical assistance to governments to strengthen regulatory authorities and enforce medicines regulations; to improve and streamline management of the procurement and supply chain; and to improve affordability and rational use of medicines, including antibiotics and antimicrobials.

Infection prevention and control

Infection prevention is critical to preventing AMR: If there is no infection, then there is no need to use antibiotics thus reducing the use, exposure and selection pressure for resistance. Good infection control measures also prevent the spread of resistant organisms. Principal AMR control measures that could have a significant potential impact on AMR include improving water, sanitation and hygiene, and scaling up immunization, particularly with vaccines such as Hib, pneumococcus and rotavirus. These activities are undertaken by other departments of WHO, but AMR provides another reason to encourage governments to invest in scale up.

Infection prevention and control (IPC) activities in health care facilities: Many of the most serious and difficult-to-treat antibiotic-resistant infections occur in health care facilities, not only because that is where patients with serious infections are admitted to but also because of the intensive use therein of antibiotics. Although the development of resistance in such situations may be a natural consequence of necessary antimicrobial use, inadequate measures to prevent and control infection may contribute to the rapid spread of these resistant microorganisms.

WHO has developed guidelines on the core components of infection prevention and control programmes, which will be published during World Antibiotic Awareness Week in November. These are based upon a series of systematic reviews, alongside expert technical review and consultation with Member States.

A technical guideline on prevention of surgical site infections (SSI) has been developed and will be launched in China in October 2016. WHO is collaborating with the Clinical Research Unit of the University Hospital of Geneva to undertake a meta-analysis of data extracted by WHO from a systematic review of the burden of SSI in developing countries.

In many regions and countries, the challenge is implementation. The scale of the issue and its impact on health is often unrecognized. In the Eastern Mediterranean region, a protocol on estimation of the point prevalence of healthcare-associated infections has been developed and will be piloted in two regions. The WHO Regional Office for South-East Asia has conducted situation analyses of stewardship programmes in healthcare settings in three priority countries: Bangladesh, India and Indonesia. The WHO Regional Office for the Western Pacific has conducted a needs assessment of IPC in countries in the region and provided tailored support to the Cook Islands and Vietnam to strengthen IPC capacity. In the Region of the Americas, a training workshop on standard precautions and isolation recommendations was held in El Salvador for Central American countries (June 2016). In addition, the WHO Regional Office supported the investigation of a multidrug-resistant organism outbreak in Lima, Peru (Sep 2016).
Monitoring and evaluation

A draft framework for monitoring and evaluation of AMR has been developed, based upon the following principles:

- In view of the multisectoral nature of AMR, it is useful to establish standard measures of impact across humans, animals, food and environment, and coordinate monitoring and reporting.
- Recognising the diversity between countries in measuring and responding to AMR, there will be country-specific outcome and impact targets that suit the country context.
- Use existing systems where possible, and minimise the burden of data requirements at a global level, by using data from regional and national levels.

Monitoring and evaluation requirements can be split into two broad elements:

- Monitoring and evaluating the process of GAP implementation: are national and global plans being well implemented; are international partners playing their roles?
- Monitoring and assessing impact: effect on outcomes, levels of AMR, antimicrobial use, prevalence of infections and influence on mortality.

The framework sets out a results chain, process and outcome measures, and suggests indicators for use at national and global levels. Following the UN General Assembly meeting we anticipate that this will be subject to even wider consultation, with the aim of contributing to a global consensus.

The feedback received on the initial monitoring tools was that intersectoral elements needed strengthening, therefore the framework to track progress at country level was developed in conjunction with FAO and OIE. The first round of data collection, from all Member States is due to commence in October 2016. This data will be published in an open-access online database that will be accessible at the 2017 World Health Assembly and to the governing bodies of FAO and OIE.
Investment in new medicines, diagnostic tools and vaccines

The economic case: From 2014 to 2016, a review of AMR was conducted by Lord Jim O Neill, economist and former UK Finance Minister, with support from the Government of the United Kingdom and the Wellcome Trust. This review carried out extensive economic modelling and has had significant traction. WHO has worked closely with the review team and welcomes its findings. WHO has also collaborated with the World Bank in their economic studies on AMR – Drug-resistant infections: A threat to our economic future – just released at the United Nations General Assembly; and with other development agencies to make the links between AMR and the Sustainable Development Goals.

Partnerships for new drug development: The Global Antibiotic Research and Development Partnership (GARDP) is a new facility for antibiotic development currently being ‘incubated’ by the Drugs for Neglected Diseases Initiative (DNDi) with WHO support. The concept was approved by Member States in November 2015 and by the DNDi Board in December 2015. DNDi has a global network of collaborators and expertise in bringing products of public health importance in developing countries into production and use. GARDP is now established with a senior executive team. The first scientific consultation was held in February 2016, where a range of potential projects for the initial pipeline were discussed. Agreement was reached to focus initially on new products with global application for gonorrhoea and neonatal sepsis and to review the scope for combining drugs and adjusting formulations for greater efficacy. WHO is active in providing technical support to GARDP.

Global stewardship framework: Work on developing the global development and stewardship framework has included internal and external consultations with experts, Member States and other stakeholders. These have resulted in the identification of options and issues for such a global framework. The Paper resulting from these consultations, “Options for establishing a global development and stewardship framework to support the development, control, distribution and appropriate use of new antimicrobial medicines, diagnostic tools, vaccines and other interventions” was presented to the Sixty-ninth WHA in May 2016 and was well received.

The UN General Assembly High-Level Meeting on AMR in September 2016 further underlined that affordability and access to existing and new antimicrobial medicines, vaccines and diagnostics should be a global priority and should take into account the needs of all countries. It called upon WHO together with FAO and OIE to further develop the global development and stewardship framework as requested by WHA.

To this end, a joint WIPO/WTO/WHO symposium on “How to Foster Innovation, Access and Appropriate Use of Antibiotics” will be held 25 Oct 2016 in Geneva. This symposium will offer a forum to exchange views and experiences in order to facilitate a better understanding of the multi-faceted global challenge of AMR and envisage possible ways forward.

New product development: WHO is developing an evidence-based list of pathogens that are a priority for new drug development at the global level. Progress in developing new Target Product Profiles for diagnostics has been delayed due to funding issues. The WHO vaccine development team has been establishing the importance of AMR within the vaccine community. A methodology for assessing impact is being developed. The importance of AMR was agreed at the Product Development Advisory Committee and will also be discussed by the main immunization Strategic Advisory Group of Experts committee.

Pictured at the official launch of GARDP: Bottom row L to R: Dagmar Rietenbach, Federal Ministry of Health of Germany; Marja Esveld, the Netherlands’ Ministry of Health, Welfare and Sports; Peter Beyer, WHO; Manica Balasegaram, Director GARDP; Gabrielle Landry Chappuis, GARD/DNDi. Top row L to R: Mercedes Tatay, MSF International; Bernard Pécout, DNDi; Jean-Pierre Paccaud, GARD/DNDi; Marie-Paule Kieny, WHO.
AMR and HIV, tuberculosis and malaria

The Global Action Plan on AMR makes reference to the importance of addressing drug resistance in HIV, tuberculosis (TB) and malaria treatment. Multi-drug resistant TB (MDR-TB) has already reached the level of a public health crisis in many countries, and increasing drug resistance is starting to complicate global efforts to fight HIV and malaria.

**HIV:** Emerging resistance to antiretroviral drugs is an increasing problem in the global response to HIV. In July 2016, WHO published a report presenting the latest available data and alerting countries to take concrete measures to mitigate the threat. Currently, 17 million people are on antiretroviral treatment and coverage should be expanded to cover all 37 million who are estimated to be living with HIV. In several low- and middle-income countries, over 10% of people beginning treatment are reported to have drug-resistant HIV. WHO estimates that by 2021 HIV drug resistance could cause an additional 420 000 deaths and increase the costs of HIV treatment delivery by nearly US$ 3 billion.

WHO has been producing technical guidance on preventing and monitoring HIV drug resistance since 2004, and has established a global HIV drug resistance laboratory network. A global report, published in 2012, summarized global HIV drug resistance data and trends in more than 40 countries. As at September 2016, nationally representative surveys were ongoing for transmitted drug resistance, paediatric drug resistance, and acquired drug resistance (in 15 countries), and pre-treatment HIV drug resistance (in 13 countries). A further 35 surveys are planned in 21 countries.

WHO routinely gathers country survey data into a global repository and produces maps tracking HIV drug resistance survey implementation and survey results. The Organization is currently developing a global database on HIV drug resistance. WHO undertakes extensive data quality checks and provides technical assistance to survey protocol development, implementation, data quality verification, and results interpretation. In the last 12 months, 33 countries have received such assistance from WHO. Furthermore, 31 laboratories around the world have been accredited by WHO for HIV drug resistance testing for surveillance purposes, providing services free-of-charge to low-and middle-income countries.

Over the past year, recognizing the need for a coordinated global effort to protect collective investments in HIV/AIDS, WHO has led the development of a Global action plan on HIV drug resistance (2017-2021).

**Tuberculosis (TB):** Globally, in 2015, there were an estimated 480 000 new cases of multidrug resistant TB (MDR-TB), or approximately 5% of total TB incidence. WHO has had an ongoing programme of global TB drug resistance surveillance since 1994. This programme is supported by a global network of 36 Supranational TB Reference Laboratories, which provides technical oversight and external quality assurance to ensure laboratory proficiency in drug susceptibility testing.

Since August 2015, seven national drug resistance surveys have been completed (see the Global Tuberculosis Report 2016, just released). During the same period, surveys were ongoing in 11 additional countries: Data show an average cure rate of only 52% for treated MDR-TB patients. In 2015, an estimated 9.5% of people with MDR-TB had extensively drug-resistant TB (XDR-TB). XDR-TB patients had a treatment success rate of 28% in 2013.

In addition, WHO has completed the first multi-country surveillance project to investigate levels of resistance to fluoroquinolones and pyrazinamide in patients with TB. Results, published in May 2016 in The Lancet Infectious Diseases journal, are critical in guiding the design of more effective regimens for patients with drug-resistant TB and for guiding the development and introduction of new regimens.

In May 2016, WHO updated its treatment guidelines for drug-resistant TB recommending use of a shorter, nine-month MDR-TB treatment regimen, which reduces treatment duration by half for selected patients when compared to the conventional, almost 2-year long regimens. Simultaneously, WHO approved a rapid molecular test for use in MDR-TB
patients to quickly triage patients into the short regimen and to identify those patients who may benefit from addition of two new TB drugs (bedaquiline and delamanid) to conventional MDR-TB regimens.

WHO has revised the composition of drug combinations for patients who need longer regimens in order to improve drug effectiveness and take better advantage of medicines such as linezolid and moxifloxacin, which have become more accessible. Rapid adoption of these recommendations is expected to reduce the global burden of drug-resistant TB. A coordinated effort with donors and technical partners is ongoing to facilitate country adoption of these guidelines and promote rational use of anti-TB medicines.

**Malaria:** WHO has supported countries in monitoring anti-malarial drug efficacy and drug resistance since 2000. The Organization regularly updates guidance for assessing antimalarial drug efficacy on the basis of expert consensus and feedback. Strengthening of national capacities is mainly achieved through regional network work shops that receive technical and/or financial assistance from WHO. WHO has established a global database containing the details and results of antimalarial drug efficacy tests conducted in malaria-endemic countries: this is used by governments to review and update their treatment policies.

At present, the treatment of uncomplicated malaria caused by the *P. falciparum* parasite relies on artemisinin-based combination therapies, or ACTs. Artemisinin resistance has been confirmed in five countries of the Greater Mekong subregion and is of paramount concern to WHO. In Cambodia, *P. falciparum* has become resistant to almost all available antimalarial medicines and there is a real risk that multi-drug resistance will soon emerge in other parts of the subregion as well.

In May 2015, Ministers of Health from the Greater Mekong subregion adopted a subregional strategy for malaria elimination. The WHO Global Technical Strategy for Malaria 2016-2030, endorsed by WHA in May 2015, also deals with the issue explicitly, urging countries to eliminate *P. falciparum* malaria in the subregion while current tools remain effective. WHO is now working with countries across the Greater Mekong subregion to scale up malaria interventions and ensure that national malaria strategies are aligned with the subregional strategy. WHO maintains a network of malaria experts covering all affected countries in the subregion, regional offices and WHO headquarters to advance these efforts.

**Neglected tropical diseases:** Every year more than a billion doses of anthelmintic drugs are distributed in countries that are endemic for parasitic worms, mostly in sub-Saharan Africa and south-east Asia. The same drugs are also used in veterinary medicine, where drug resistance is already a significant challenge. To anticipate the emergence of drug resistance in public health programmes, WHO established a working group on drug efficacy in 2010. In 2013, WHO issued guidelines to standardize studies on resistance to drugs used in large-scale programmes for the control of schistosomiasis and soil-transmitted helminthiasis.

Since August 2015, WHO and partners have conducted more than 15 evaluations of anthelmintic drug efficacy, together with training programmes for endemic countries on how to conduct these trials through a standardized protocol. While drug resistance has not been detected yet in humans, WHO has worked with three of its collaborating centres (in Ghent, Basel and Pemba) to develop a proposal for the evaluation of alternative drug combinations. Field activities to test the drug combinations will begin in November 2016.

**Special Programme for Research and Training in Tropical Diseases (TDR):** The WHO-hosted Special Programme for Research and Training in Tropical Diseases (TDR) has been funding:

- research for better management of fever in young infants including antibiotic susceptibility of pathogens; and
- training of officers of national TB control programmes to use their country’s data to develop relevant research questions, test hypotheses, and identify ways of enhancing disease control through changes to policy or service delivery (see Panorama, the WHO European Regional Office’s journal, and the *Pan American Journal of Public Health*).

TDR has also funded research on

- cost-effective approaches for surveillance and early detection of resistance during seasonal malaria chemoprevention;
- the variability of parasites’ response to drugs before and early on during mass treatment;
- models of parasite transmission that take into account genetically determined drug susceptibility; and
- genetic markers of drug response of the parasite causing river blindness.
Finally....

As I said at the outset, it is gratifying to see scale up of interest and activity across a wide range of organizations. Our challenge now is to ensure that the activity and initiatives embarked upon over the last year are sustained and translated into effective action where it matters most. One thing is abundantly clear - we can only combat AMR by working together.

I would like to take this opportunity to express my gratitude to the small but very dedicated Secretariat team in headquarters and to all the highly motivated staff across WHO headquarters, regional and country offices without whom no progress would be made. I would also like to say a special thanks to our newsletter editor for helping us communicate what we have accomplished.

Marc Sprenger, Director, AMR Secretariat

List of Acronyms

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<tr>
<th>Acronym</th>
<th>Definition</th>
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<tr>
<td>AFRO</td>
<td>WHO Regional office for Africa</td>
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<td>AGISAR</td>
<td>Advisory Group on Integrated Surveillance of Antimicrobial Research</td>
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<td>AMC</td>
<td>antimicrobial medicines consumption</td>
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<td>AMR</td>
<td>antimicrobial resistance</td>
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<tr>
<td>AST</td>
<td>antimicrobial susceptibility testing</td>
</tr>
<tr>
<td>CAESAR</td>
<td>Central Asian and Eastern European Surveillance of Antimicrobial Resistance</td>
</tr>
<tr>
<td>CIA</td>
<td>critically important antimicrobials</td>
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<tr>
<td>DNDi</td>
<td>Drugs for Neglected Diseases initiative</td>
</tr>
<tr>
<td>EARS-NET</td>
<td>European Antimicrobial Resistance Surveillance Network</td>
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<tr>
<td>EU</td>
<td>European Union</td>
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<tr>
<td>EUCAST</td>
<td>European Committee on Antimicrobial Susceptibility Testing</td>
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<tr>
<td>EURO</td>
<td>WHO Regional Office for Europe</td>
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<tr>
<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
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<tr>
<td>GARDP</td>
<td>Global Antibiotic Research and Development Partnership</td>
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<tr>
<td>GLASS</td>
<td>Global AMR Surveillance System</td>
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<tr>
<td>IPC</td>
<td>infection prevention and control</td>
</tr>
<tr>
<td>MDR-TB</td>
<td>multi-drug resistant tuberculosis</td>
</tr>
<tr>
<td>NAP</td>
<td>national action plan</td>
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<tr>
<td>OIE</td>
<td>World Organisation for Animal Health</td>
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<tr>
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<td>SAGE</td>
<td>Strategic Advisory Group of Experts</td>
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<tr>
<td>SSI</td>
<td>surgical site infection</td>
</tr>
<tr>
<td>ReLAVRA</td>
<td>Latin American Antimicrobial Resistance Surveillance Network</td>
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<tr>
<td>TB</td>
<td>tuberculosis</td>
</tr>
<tr>
<td>TDR</td>
<td>Special Programme for Research and Training in Tropical Diseases</td>
</tr>
<tr>
<td>UNGA</td>
<td>United Nations General Assembly</td>
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<tr>
<td>WAAW</td>
<td>World Antibiotic Awareness Week</td>
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<tr>
<td>WHA</td>
<td>World Health Assembly</td>
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<td>WHO</td>
<td>World Health Organization</td>
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<td>WPRO</td>
<td>WHO Regional Office for the Western Pacific</td>
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