World Health Organization

European Region

Mainstreaming antimicrobial resistance interventions into primary health care in Kazakhstan

Mission report

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Abstract

Antimicrobial resistance (AMR) is a major threat to global health. WHO worked with Kazakhstan and three other countries (Indonesia, Sweden and Thailand) to identify best practices, gaps and further opportunities for integrating AMR interventions into primary health care. There has been a long history of investment in primary health care in Kazakhstan, and the regulatory environment provides a strong foundation for AMR-relevant interventions, such as on the appropriate use of antibiotics and infection prevention and control, with a need for strengthening enforcement of some regulations. This report provides the background, findings, and summary of discussion points and recommended actions arising from a national stakeholder workshop held in Almaty, Kazakhstan, in August 2024. Key recommended actions include: Integrating basic indicators related to AMR into primary care management and practice; strengthening and extending health information systems to ensure standardized information on diagnoses, treatment and prescription in primary care facilities; and expanding opportunities for education and training on AMR for health care providers, with regular, practical opportunities to refresh skills and knowledge. These recommended actions could form the basis for future technical assistance to integrate AMR interventions into Kazakhstan's PHC-oriented health system.

Keywords

ANTIMICROBIAL RESISTANCE; ANTIMICROBIAL STEWARDSHIP; KAZAKHSTAN; PRIMARY HEALTH CARE; PUBLIC HEALTH; WORLD HEALTH ORGANIZATION

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Abbreviations

AMR	antimicrobial resistance
AMS	antimicrobial stewardship
ATC	Anatomical Therapeutic Chemical
AWaRe	Access, Watch and Reserve (WHO classification of antibiotics)
COVID-19	coronavirus disease
CPD	continuing professional development
DDD	defined daily dose
DID	defined daily doses per 1000 inhabitants per day
HAI	health care-associated infections
Hib	Haemophilus influenza type B
IPC	infection prevention and control
MoH	Ministry of Health
NCPH	National Centre for Public Health
PHC	primary health care
UNICEF	United Nations Children's Fund

Executive summary

This report was developed as part of a project to validate use of WHO's people-centred approach to addressing antimicrobial resistance (AMR) in human health, specifically at the level of primary health care (PHC). In countries, it is essential to link AMR interventions with health systems strengthening, including extending universal health coverage through PHC and building capacity for pandemic preparedness and response. To explore ways in which this might be achieved, scoping reviews were undertaken to identify gaps and opportunities for mainstreaming AMR interventions in a PHC-oriented health system in four countries, including Kazakhstan, with a tool outlining 22 indicators and areas in which AMR and PHC intersect. In Kazakhstan, nine thematic areas were selected for a deep dive review, in consultation with national focal points nominated by the Ministry of Health (MoH). This publication includes a report on a national stakeholder workshop held in Almaty, Kazakhstan, in August 2024.

Findings

Policies and governance. Kazakhstan has developed a national action plan to combat AMR titled *"On Measures to Contain Antimicrobial Resistance in the Republic of Kazakhstan for 2023–2027."* The aim of the plan is to improve the monitoring and containment of resistant microorganisms at all levels of public health and agriculture.

The containment of AMR is achieved through effective communication, education and training, expansion of laboratory infrastructure, strengthening of surveillance and control systems, as well as the improvement of preventive measures, optimization of antimicrobial use in human and animal health, enhancement of professional education, and reinforcement of intersectoral cooperation in efforts to contain AMR.

An intersectoral working group on AMR has been established, the members comprising clinical pharmacologists, public health workers, microbiologists and representatives of the ministries of Health and of Agriculture. The working group meets at least twice a year to discuss implementation of the national AMR road map, problems, solutions and plans. A national AMR focal point has been assigned to the human health sector.

Some regulations are in place to ensure appropriate use of medicines, although AMR does not appear to be explicitly considered or included in PHC policies and procedures. In recent years, within the framework of the state order, targeted funding has been allocated from the state budget for activities related to the monitoring and implementation of roadmaps on AMR and infection prevention and control (IPC).

For primary care facilities, governance structures related to AMR include IPC coordination, such as an infection control commission that is responsible for developing and managing the infection control programme in a facility. Some primary care facilities have a multidisciplinary committee or a team that meets regularly to discuss plans, processes, actions and monitoring. While these teams address IPC, including monitoring and reporting, AMR and antimicrobial stewardship (AMS) do not appear to be systematically covered. Primary care facility managers would benefit from clear national guidance on use of their resources for AMR. The MoH does not have clear oversight over private primary care facilities, and private facilities are not included in national data collection or reporting mechanisms.

Civil society and professional association engagement. Professional associations involved in the national AMR response include the Professional Association of Clinical Pharmacologists and Pharmacists, the Federation of Laboratory Medicine, the Federation of Anaesthesiologists and Reanimatologists and the National Association of Obstetricians and Gynaecologists. No community or civil society organizations appear to be involved in the national AMR response, and it is not known whether any are involved locally.

Regulations on non-prescription sales of antimicrobials and availability of antibiotics in primary care. Over-the-counter sales of prescription drugs is prohibited by law in Kazakhstan; however, there is evidence that antibiotics are commonly sold over the counter in pharmacies and that the public expects to be able

to buy them. Generally, primary care facilities can prescribe from only a limited list of oral antibiotics, typically including amoxicillin, amoxicillin–clavulanic acid, azithromycin, doxycycline, ciprofloxacin and co-trimoxazole. Prescribed drugs are provided for free by hospital pharmacies, if they are in stock and on the primary care formulary. Stakeholders who attended the workshop in August 2024 indicated that antibiotics are widely available in the country.

AMS and antimicrobial use. There is insufficient published information on how appropriate use or AMS is integrated into activities at primary care facilities. National clinical protocols have been developed by the National Scientific Centre for Health Development, which are reviewed every 3 years by national specialists and professional organizations, which receive some financial compensation for their work. In district hospitals, audits may be undertaken by high-quality control teams to ensure that doctors adhere to guidelines, although it is unclear whether this is systematic and regular or only when a precipitating event occurs, such as a patient complaint or complications of treatment. Checks are undertaken by administrators of the social health insurance system, especially for treatments that deviate from clinical protocols or are particularly expensive. It is not known whether prescription and diagnosis reviews are conducted systematically at primary care facilities.

To support professionals who prescribe and dispense, clinical pharmacologists at primary care facilities develop guidelines for appropriate use of antibacterial agents. The Professional Association of Clinical Pharmacologists is also developing antibiotic treatment guidelines based on the WHO Access, Watch and Reserve (AWaRe) book (as of August 2024). Recent data show that there is overreliance on Watch group antibiotics in Kazakhstan. Of the 10 most frequently consumed antibiotics in primary care, five were broad-spectrum Watch group antibiotics. A key recommended action is to review the antibiotics on the national list of medicines to ensure that antibiotics are available for the most common infectious diseases in the country, with a review of clinical treatment guidelines to ensure appropriateness.

Most public primary care facilities use an electronic patient records system, such as Damumed, to record information on prescriptions and some information on diagnoses. The systems usually cover only outpatient prescriptions at public primary care facilities covered by mandatory social health insurance. Another recommendation arising from the review and the workshop in August 2024 is to strengthen health information systems by standardizing and integrating the systems used, which would facilitate data collection and enable the monitoring of indicators of appropriate use of antimicrobials.

Community health promotion, education and engagement on AMR. Although the evidence is sparse, it indicates insufficient knowledge and awareness about antibiotic use and resistance in Kazakhstan. While some events are organized, such as to coincide with World Antibiotic Awareness Week, it is recommended that national stakeholders develop a strategy to increase public knowledge of and awareness about AMR, including through age-appropriate education on AMR in schools.

Pre-service and in-service training and support on AMR for the primary care workforce. The standard curricula for medical and pharmacy students in Kazakhstan are regulated by the MoH. They include subjects such as microbiology, infection control and clinical practice but make no explicit mention of AMR or AMS. Doctors, nurses and pharmacists in Kazakhstan are required to engage in continuing professional development (CPD) programmes in order to renew their licenses and certifications. Specific requirements for CPD, such as the number of hours and types of activities, are regulated by the MoH. It is not clear whether AMR is included in CPD or to what extent. The extent of uptake of these courses is also unknown.

A long history of prioritizing and investing in PHC provides a good foundation for introducing and extending AMR interventions in primary care. In collaboration with the MoH and national stakeholders, targeted technical assistance could be provided by WHO and the WHO Collaborating Centre at the Public Health Agency of Sweden to support implementation of a prioritized subset of the recommendations in this report.

Introduction

Antimicrobial resistance (AMR) is one of 10 major threats to global health. The increasing number of infections caused by AMR pathogens is already of pandemic proportions. In 2019, bacterial AMR resulted in approximately 1.27 million deaths and contributed to an additional 4.95 million deaths globally *(1)*. To contain AMR, WHO Member States endorsed the Global Action Plan on AMR *(2)* in 2015 and committed themselves to developing national action plans for AMR. Progress has been made, as 170 countries have developed a national action plan on AMR; however, sustainable implementation remains low *(3)*. Over 70% of the plans are neither costed nor budgeted, and implementation is often fragmented, with no recognition of the interdependency of interventions with other work on health systems strengthening. It is essential to link national AMR interventions more firmly with health systems strengthening, including for achieving universal health coverage through primary health care (PHC) and building capacity for pandemic preparedness and response.

In the WHO European Region, the 73rd session of the WHO Regional Committee for Europe in Astana, Kazakhstan, in October 2023 endorsed the Roadmap on Antimicrobial Resistance for the WHO European Region 2023–2030 *(4)*. The Roadmap provides strategic guidance to prioritize and implement high-impact interventions to prevent and control AMR. The vision for AMR in the Region is that, by 2030, people and animals will be safer from hard-to-treat, resistant infections in healthier environments *(5)*. The Roadmap is based on a people-centred approach *(6)* to engaging and empowering individuals as partners in addressing AMR. This includes engagement of community primary care and pharmacy teams in using health promotion to address the environmental and social determinants of health.

A scoping review was conducted to identify gaps and opportunities for mainstreaming AMR interventions into PHC in Kazakhstan. A tool was used to identify the areas at which AMR and PHC intersect, which is based on WHO's People-centered approach to addressing antimicrobial resistance in human health: a core package of interventions to support national action plans *(7)*, with reference to the Primary health care measurement framework and indicators *(8)*, published by WHO and the United Nations Children's Fund (UNICEF). The tool was used in consultation with national focal points nominated by the Ministry of Health (MoH), the WHO European Centre for Primary Health Care (based in Almaty) and the WHO Country Office in Kazakhstan, to identify nine thematic areas aligned with the country's priorities:

- integration of AMR into national PHC plans and strategies;
- mechanisms for governance of antimicrobial stewardship (AMS), PHC and universal health coverage;
- engagement of civil society and professional associations in the AMR response;
- regulations to restrict non-prescription sales of antimicrobials;
- community health promotion on AMR;
- community engagement in access to AMR-related health products and services;
- pre-service education on AMR for primary care workers;
- in-service training and support on AMR for primary care workers; and
- immunization.

A desk review was then conducted to review published academic literature, relevant national policies and guidelines and other documents and data published by the Government of Kazakhstan. Information was also collected during site visits to primary care facilities (Image 1). A national stakeholder workshop was then held in Almaty, Kazakhstan, in August 2024 (Image 2–4).

Image 1. Site visit to Almaty city PHC #5, August 2024

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AMR in Kazakhstan: context, burden and response

In the Global Research on Antimicrobial Resistance project, it was estimated that, in Kazakhstan in 2019, 2400 deaths were attributable and 9500 deaths were associated with AMR *(9)*. The AMR Collaborators estimated that the age-standardized mortality rate associated with AMR in Kazakhstan was 50–60 deaths per 100 000 *(10)*. The five most dangerous pathogens in Kazakhstan are *Escherichia coli* (1800 deaths associated with AMR), *Klebsiella pneumoniae* (deaths: 1500), *Staphylococcus aureus* (deaths: 1200), *Pseudomonas aeruginosa* (deaths: 969) and *Streptococcus pneumoniae* (deaths: 792) *(9)*.

A national action plan on AMR has been developed *(11)*, as reported to the WHO Tracking AMR Country Self-assessment Survey. A national intersectoral working group on AMR has been established, the members comprising clinical pharmacologists, public health workers, microbiologists and representatives of the Ministry of Agriculture. A national AMR focal point has been assigned for the human health sector.

The Government also works with international partners such as WHO and the United States of America's Centers for Disease Control and Prevention. The latter is working with the MoH and hospitals in Kazakhstan to strengthen surveillance and testing of antimicrobial drug-resistant pathogens. The Scientific and Practical Centre for Sanitary and Epidemiological Expertise and Monitoring at the MoH is the national coordinating centre for implementation and monitoring of AMR surveillance.

Monthly sentinel epidemiological surveillance is conducted in 24 health-care organizations in Almaty (three), Astana (one), Shymkent (two), Karaganda (two), Aktobe (one), Mangystau region (two), North Kazakhstan region (two), Kyzylorda region (two), Atyrau region (two), National Centre for Expertise and Public Health branches (four) and in the private laboratories OLYMP and Invivo. Since 2019, the sentinel laboratories have participated annually in Central Asian and European Surveillance of Antimicrobial Resistance external quality assessments, with support from the United Kingdom National External Quality Assessment, to test challenge strains and determine their antibiotic susceptibility *(12)*. Kazakhstan participates in the WHO Regional Office for Europe network for antimicrobial consumption but is not currently enrolled in the WHO Global Antimicrobial Resistance and Use Surveillance System.

The Kazakhstan National Drugs Formulary is updated regularly *(13)*; publicly available data indicate that the latest update was in 2023. Most antibiotics that are on the 2019 WHO Model List of Essential Medicines are on the national list of essential medicines; exceptions are cefalexin, cloxacillin, dicloxacillin or flucloxacillin, phenoxymethylpenicillin and spectinomycin. Other antibiotics that have been removed from the WHO Model List but are still on the national list of essential medicines are cefepime, erythromycin and ofloxacin *(14)*.

According to a study by the WHO Regional Office for Europe on the patterns of community supply of antiviral and antibacterial agents in community pharmacies during the coronavirus disease 2019 (COVID-19) pandemic in nine eastern European and Central Asian countries, the oral antibacterial agents that were most frequently supplied in Kazakhstan were ciprofloxacin, azithromycin, amoxicillin, amoxicillin + clavulanic acid and cefuroxime *(15)*. Three of these are Watch group agents (ciprofloxacin, azithromycin and cefuroxime) in the WHO AWaRe classification. The third-generation cephalosporin ceftriaxone – also a Watch group agent – was the parenteral agent most frequently supplied by community pharmacies in Kazakhstan. This is of particular concern, as ceftriaxone is recommended only as the treatment of first or second choice for very few infectious diseases in the AWaRe antibiotic book, which, in general are conditions treated in hospitals rather than in primary care. The use of third-generation cephalosporins increases the risk of colonization or infection with multidrug-resistant organisms such as extended-spectrum beta-lactamase. While this analysis is not specific to primary care, it suggests an overreliance on Watch group antibiotics, including for upper respiratory tract infections, of which the majority are viral infections. Prescribing practices and clinical treatment guidelines should therefore be reviewed at all levels of health care.

Total consumption of antibacterials for systemic use in Kazakhstan was 14.3–17.4 defined daily doses (DDDs) per 1000 inhabitants per day (DID) according to sales data for the country in 2015–2018 *(16)*. This consumption is more moderate than that of other countries in the WHO European Region antimicrobial consumption network, although data were not available for every year, and the COVID-19 pandemic may have altered the trend.

Zhussupova et al. *(17)* evaluated antibiotic use in Kazakhstan for 2017–2019 with the Anatomical Therapeutic Chemical (ATC)/DDD method. The study was based on data on all antibiotics that were bought centrally by a single purchaser during the study period but did not include data from the private health sector, which are not included in the national compulsory social and medical insurance system. Furthermore, the results were not disaggregated by health-care level. The study showed a decrease in total antibiotic consumption, from 3.03 DID in 2017 to 2.66 DID in 2018 and 2.00 DID in 2019. These numbers are lower than those in other countries. In 2019, the number of antibiotics consumed decreased to 29, of which 17 are on the WHO list of essential medicines. Of the 29 antibiotics, 6 were Access, 21 were Watch, and 2 were Reserve group antibiotics (fosfomycin intravenous and linezolid). This indicates a reduction in consumption of Access group antibiotics, from 39% to 30% during 2017–2019, implying increased use of Watch/Reserve (broad spectrum) antibiotics. During the same period, there was a trend of decreasing consumption of Access group antibiotics, from 1.17 DID in 2017 to 0.59 DID in 2019, and increased consumption of Watch group antibiotics, from 1.84 DID in 2017 to 1.37 DID in 2019.

Semenova et al. *(18)* in 2024 reported that consumption of J01 antibiotics[1] in DDD per 1000 inhabitants per day was 14.47 in 2020 and 10.87 in 2022, indicating a reduction in antibiotic consumption over that period. Azithromycin was the most frequently consumed antibiotic, followed by ceftriaxone and ciprofloxacin, all of which are Watch group antibiotics. A possible reason for the high consumption of azithromycin may be due to early reports of its usefulness in the treatment of COVID-19, which influenced clinical practice.

Balapasheva et al. *(19)* assessed changes in antibiotic consumption by patients in a regional hospital in Aktobe in 2019 with that at the peak of the COVID-19 pandemic in 2020. Significant increases in consumption of broad-spectrum antibiotics, including azithromycin, gentamicin, levofloxacin and ceftriaxone were found.

Core components and minimum requirements for IPC were assessed in 2021 at 78 randomly selected hospitals in 17 administrative regions with adapted WHO tools *(20)*. The study included site assessments, followed by structured interviews with 320 hospital staff, observation of IPC practices, and document reviews. All the hospitals had at least one dedicated IPC staff member; 76% had staff with any formal training in IPC; 95% had an IPC committee; 54% had an annual IPC work plan; 92% had any IPC guidelines; 55% had conducted any IPC monitoring in the past 12 months and reported the results to facility staff, but only 9% used the data to make improvements; 93% had access to a microbiological laboratory for surveillance of health care-associated infections (HAI), but HAI surveillance with standardized definitions and systematic data collection was conducted in only one hospital.

In 2022–2024, an assessment of the level of IPC implementation was conducted in 23 multidisciplinary hospitals (not confined to primary care) in each region of the country, using the WHO IPC assessment framework tool (unpublished data).[2] All the hospitals had IPC specialists, an IPC committee and basic documentation (including programme, reports and standard operating procedures); however, there were no data on HAI surveillance. The official rate of HAI is very low (0.13% in 2022). The MoH and the National Centre for Public Health (NCPH) conducted a national point prevalence survey of HAI and use of antimicrobials[3] and found a prevalence of HAI of 3% overall and 9.1% in high-risk departments (based on unpublished data). The level of antimicrobial use was high (40,2%), and 67% of prescriptions were not sufficiently justified in medical notes. During the COVID-19 pandemic, WHO and the United States Centers for Disease Control and Prevention supported an assessment of IPC capacity in 95 outpatient facilities and 18 hospitals in five cities in Kazakhstan and made recommendations for improving IPC in the facilities *(21)*.

[1] ATC code J01, "Antibacterials for systemic use", is a subgroup of the ATC system used for the classification of drugs and medical products.

[2] Ministry of Health, Kazakhstan, unpublished data.

[3] Unpublished.

PHC in Kazakhstan

During the past two decades, Kazakhstan has transformed its PHC system in line with the principles set forth in the Declarations of Alma-Ata 1978 and of Astana 2018. During this period, Kazakhstan, one of the pioneers in the WHO European Region, shifted from a biomedical, disease-centred, specialist-oriented approach to a more holistic, multidisciplinary team-based PHC model *(22)*.

In the late 1990s, reform of primary care service delivery began with retraining of district internists and paediatricians as family doctors and establishment of family medicine health centres as separate entities within polyclinic facilities. This initial transformation faced challenges, however, due to insufficient sustainable financing, inadequate governance mechanisms and insufficient non-clinical competence and resources for the newly introduced family doctors. Consequently, the new PHC model was not well received by the public, leading to re-establishment of the previous system of polyclinics and specialists by 2003.

This specialist-staffed, fragmented PHC system was inefficient and was still unable to meet people's health needs and expectations. Drawing on international best practices, Kazakhstan reintroduced a family medicine-based approach with deeper understanding of the importance of non-clinical competence, such as person- and community-centredness and a holistic approach, which are crucial for delivering comprehensive care. A 5-year health system reform plan was initiated in 2005 to shift towards a PHC-centred health system. In 2009, the concept of a unified national health system was introduced, which included features such as free choice of providers, pay-for-performance and quality improvement.

Since 2011, PHC teams have been extended to provide more holistic services to better address social determinants of health in the community. In 2015, PHC teams were extended to include three primary care nurses per doctor, social workers and psychologists.

Between 2016 and 2020, the PHC transformation included wide-scale consolidation of a multidisciplinary approach to PHC, provision of psychosocial care and greater autonomy of nurses. Concrete policy steps were made to ensure a more people-centred model of care provided by multidisciplinary teams consisting of family doctors, primary care nurses, social workers and psychologists. This phase also included PHC strengthening for universal health coverage, emphasizing the importance of early prevention and digitalization. Early adopters, such as the Enbekshikazakh District in Kazakhstan's Almaty Region, which became the first WHO PHC demonstration platform, and other facilities were identified as the 17 best-practice PHC centres. Some have demonstrated the vision for PHC in practice.

At present, primary care services are free for the entire population and are provided at different layers in urban and rural areas of the country. Primary care services in Kazakhstan generally comprise diagnosis for early detection of diseases; outpatient treatment; inpatient care (day hospital, hospital at home); examination of temporary disability; preventive examinations; immunization; promotion of healthy lifestyles; nutritional recommendations; family planning, maternity and childbirth services; and monitoring of health status, including screening programmes.

In rural areas, the traditional *feldsher*-midwifery posts and medical stations have been retained as the basic layer of primary care *(23)*, complemented by ambulatory rural physicians and second-level district polyclinics. Mobile primary care teams and telemedicine services have also been deployed, especially during the COVID-19 pandemic. Three "health trains" have been sent out since 2010, which deliver health services for communities in remote areas of the country. Each train is equipped with diagnostic and laboratory equipment and about 20 health professionals. Between 2010 and 2023, the trains provided approximately 700 000 consultations for the populations of over 15 000 remote settlements in all 14 regions (*oblasts*) of Kazakhstan.

In urban areas, primary care is usually provided at multi-specialty polyclinics and specialized polyclinics with multidisciplinary primary care teams consisting of general practitioners, primary care nurses, social

workers and psychologists, with integrated disease management programmes.

Primary care is provided to the population in over 7000 primary care facilities, including 2991 medical centres, 836 first aid stations, 1379 medical outpatient clinics and 2182 polyclinics, of which 59% are public and 41% are private *(24)*. About 10 000 doctors and 28 000 paramedical workers work at primary care level, of whom 47% are in rural areas.

In terms of the budget for the health system, the MoH Department of Finance is responsible for funding medical education, capital investments and certain components of the State guaranteed benefits package, either through direct payments to providers or by allocations to *oblast* health departments. The Committee of Medical Universities finances a significant portion of the State guaranteed benefits package, including inpatient and outpatient care in rural areas. Most primary care appears to be financed by *oblast* health departments, including outpatient drugs and public health promotion programmes.

Primary care financing in Kazakhstan is based on a capitation model, complemented by a pay-for-performance system for meeting indicators for six components: cardiovascular diseases, maternal and child morbidity and mortality, tuberculosis, oncology and complaints. A mandatory social health insurance fund was established in 2016 as the single payer, and mandatory social health insurance has been instituted nationwide since 2020. Regardless of contributions to the social health insurance fund, the State guarantees access to a universal package of benefits, including primary care and free medicines, such as antibiotics, on an approved list of medicines. An additional package of services and benefits is funded by mandatory health insurance, which does not, however, cover all residents, and 16.2% of the population was not insured at the end of 2020 *(25)*. Public coverage of outpatient pharmaceuticals, including antibiotics, has been described as very poor *(26)* and appears to be a major contributor to the burden of out-of-pocket payments *(23)*.

The antibiotics included in the mandatory health insurance package *(27)* are:

- penicillins: amoxicillin, ampicillin, amoxicillin + clavulanic acid, oxacillin, benzylpenicillin and piperacillin/tazobactam;
- cephalosporins: cefazoline, cephalexin, cefuroxime, cefotaxime, ceftriaxone, cefixime, ceftibuten, ceftazidime and cefepime;
- carbapenems: meropenem and imipenem + cilastatin;
- monobactams: aztreonam;
- macrolides: azithromycin, clarithromycin, erythromycin and spiramycin;
- fluoroquinolones: ciprofloxacin, levofloxacin, moxifloxacin, ofloxacin and norfloxacin;
- tetracyclines: doxycycline and tetracycline;
- amphenicols: chloramphenicol;
- aminoglycosides: gentamicin, amikacin, tobramycin and streptomycin;
- lincosamides: clindamycin and lincomycin;
- glycopeptides: vancomycin; teicoplanin
- oxazolidinones: linezolid;
- rifamycins: rifampicin;
- sulfonamides: co-trimoxazole (trimethoprim + sulfamethoxazole);
- nitroimidazoles: metronidazole;
- nitrofurans: nitrofurantoin and furazidine; and
- phosphonic acids**:** fosfomycin.

Image 2. Group discussions at national stakeholder workshop, Almaty, August 2024

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1. Mainstreaming AMR into PHC: policies and governance

1.1. Integration of AMR into national PHC policies and strategies

The Code on the Health of the People of Kazakhstan and the Health Care System (2020; latest amendments and additions in 2024) is the main policy framework for health care and PHC in Kazakhstan.

Legislation in Kazakhstan addresses rational use of medicines, including:

- rules for implementation of the formulary system, approved by order of the Minister of Health on 6 April 2021 No. RK HM-28 (Register of State Registration of Regulatory Legal Acts No. 22513); and
- rules for assessing rational use of medicines, approved by order of the Minister of Health on 3 November 2020 No. RK HM-179/2020 (Register of State Registration of Regulatory Legal acts No. 21586).

AMR and rational use of medicines are described in the State Health Care Development Programme for 2020–2025 as a "threat" to solutions and requiring interdepartmental regulatory mechanisms. A national AMR road map is available in Kazakh and Russian.

A national IPC plan, "On the Improvement of the infection prevention and control system for 2022–2027" is to be implemented by the Committee for Sanitary and Epidemiological Control of the MoH. Progress in implementation is to be reported four times a year. The plan specifies minimum requirements for IPC at primary care facilities and monitoring of compliance with standard operating procedures.

According to the Code of Kazakhstan "On People's Health and the Healthcare System", medical activities must be licensed. The types of medical activity subject to licensing are defined by the Law "On Permits and Notifications", which includes PHC, outpatient and polyclinic care and laboratory diagnostics.

Licensing of primary care facilities is regulated by the Rules for Providing the State Service regarding issuance of a license for medical activities. Licenses and their annexes are issued by the territorial departments of the Medical and Pharmaceutical Control Committee at the licensee's location. The requirements include compliance of premises with regulations for sanitation and hygiene, to be approved by the Committee for Sanitary and Epidemiological Control and the Committee for Medical and Pharmaceutical Control. Specialists must be certified and have undergone advanced training in their declared types of medical activity within the past 5 years. AMR, AMS, IPC and drug management are not included in primary care licensing requirements. Meeting quality standards is not mandatory for accreditation of primary care facilities.

Regulations governing the quality of pharmacy services include quality assurance and standard operating procedures to be followed by community pharmacies. Pharmacies are also obliged to perform regular self-inspections, and a quality management system is a requirement for renewal of pharmacy licenses *(28)*. There is some evidence that antibiotics are commonly sold in community pharmacies without a prescription *(29)*.

Integrated Management of Childhood Illness has been implemented in Kazakhstan since the 1990s. According to a review of practices in the WHO European Region *(30)*, informants in all countries, including Kazakhstan, reported that implementation of IMCI promoted rational use of antibiotics and decreased "polypharmacy" after training in PHC and hospitals. In general, this was achieved by use of standard treatment guidelines for decisions on whether to prescribe antibiotics according to clinical signs and symptoms and classification of severity. The guidelines aided practitioners in choosing treatment and counselling patients appropriately and educating them to change their perceptions and expectations of care.

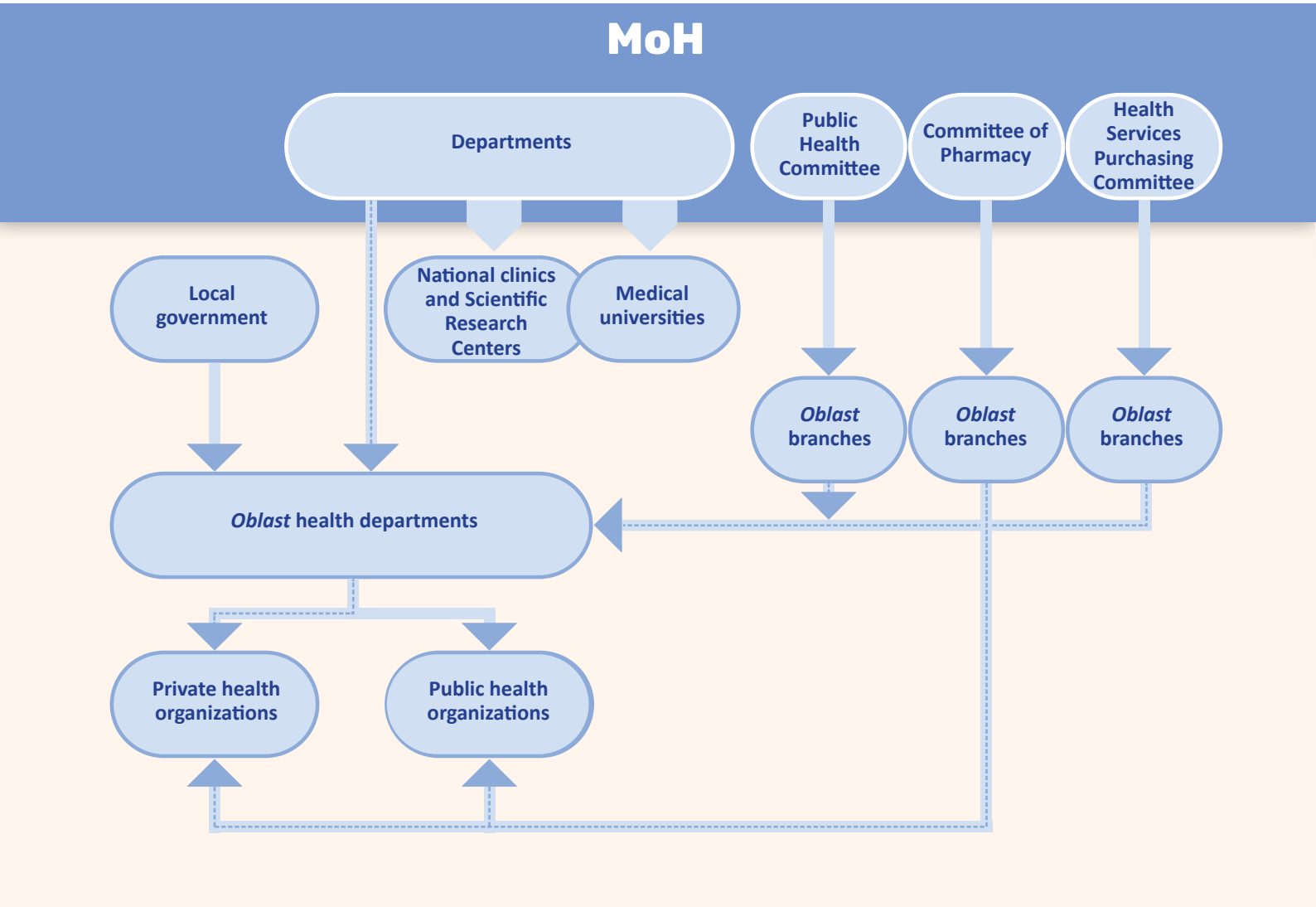
The WHO European Centre for Primary Health Care currently supports work in Kazakhstan on indicators for monitoring PHC performance. The indicators do not include AMR specifically, although they include health screening of target groups and vaccination.

Overall, while relevant regulations guide appropriate use of medicines and there is some national commitment to AMR, AMR does not appear to be explicitly considered or included in PHC policies and procedures in practice. Targeted funding has been allocated from the state budget for activities related to the monitoring and implementation of roadmaps on AMR and IPC. Primary care facility managers would benefit from clear national guidance on use of limited resources and work on AMR. The MoH does not have clear oversight of private primary care facilities, which are not included in national data collection and reporting.

1.2. Governance mechanisms for AMR, PHC and universal health coverage

Fig. 1 shows the overall structure of governance of PHC in Kazakhstan. The MoH provides overall policy guidance, and primary care facilities report to oblast health departments.

Fig. 1. Governance structure for PHC in Kazakhstan



Source: Socha *(31)*

Nationally, an interdepartmental working group on AMR in the health sector has been established, the members comprising doctors, clinical pharmacologists, epidemiologists, microbiologists and representatives of the Ministry of Agriculture *(32)*. The group meets at least twice a year to discuss implementation of the national AMR road map, plans, challenges, and potential solutions.

A national AMR coordinator has been appointed for the human health sector, and the National Center of Public Health under the Ministry of Health has been designated as the coordinating centre for implementing AMR roadmap activities.

Regulatory acts have been adopted to ensure the proper use of medicines and national adherence to AMS. As part of the state mandate, funding is allocated to the National Center of Public Health for the implementation of AMS activities, the implementation of a national surveillance and control system for AMR in Kazakhstan, and for monitoring the implementation of the national IPC plan. This includes conducting training seminars, workshops, meetings, and the development and revision of methodological guidelines.

Currently, in the context of AMR containment activities, Kazakhstan is working on implementing the WHONET programme in private laboratories, in cooperation with the diagnostic laboratory network OLYMP, which provides laboratory services to 70% of both private and public health care facilities.

The Scientific and Practical Centre for Sanitary and Epidemiological Expertise and Monitoring was designated as the national coordinating centre, and the laboratory was designated as the reference laboratory for bacterial infections and antibiotic resistance detected by sentinel epidemiological surveillance *(32)*, with international and intersectoral cooperation.

For IPC, the NCPH of the MoH is designated as the coordinating centre for implementing the plan "On Improving the Infection Prevention and Control System for 2022-2027" *(33)*.

At facility level, governance structures related to AMR include IPC coordination. According to the Model Regulation of the Infection Control Commission, each facility should establish an infection control commission and develop a programme for infection control in that facility. Coordination of infection control is assigned to the first head of the medical organization. The chairman of the commission is usually the deputy chief physician. The infection control programme includes the following:

- organization of full, timely accounting and registration of HAIs;
- detailed analysis of HAI morbidity, determination of causes, identification of risk factors, investigation of outbreaks of HAIs and appropriate measures to eliminate them;
- development of algorithms for epidemiologically safe medical and diagnostic procedures, a sanitary and anti-epidemic regime based on operational epidemiological analysis, monitoring the formation of hospital strains and forecasting the epidemiological situation;
- organization and implementation of microbiological monitoring;
- development of a programme for antibiotic prophylaxis and tactics for antibiotic therapy;
- training of medical personnel in infection control; and
- organization of measures to prevent cases of occupational diseases.

Some primary care facilities have a multidisciplinary committee or a team that meets regularly to discuss plans, processes, actions and monitoring. While IPC appears to be covered by these teams, including monitoring and reporting, AMR and AMS are not covered systematically.

1.3. Civil society and professional association engagement in the AMR response

According to Article 2 of the law "On public associations", political parties, trade unions and other citizens' associations are voluntary, non-profit organizations and are established at the initiative of a group of at least 10 citizens. Republican, regional and local public associations can be established and operate.

Professional associations involved in the national AMR response include the Professional Association of Clinical Pharmacologists and Pharmacists, the Federation of Laboratory Medicine, the Federation of Anaesthesiologists and Reanimatologists and the National Association of Obstetricians and Gynaecologists. For instance, the Professional Association of Clinical Pharmacologists and Pharmacists purchases data on national antimicrobial use from VIORTIS, a private company, and conducts basic analysis and reporting. They also regularly conduct research and organize informational and educational events during World Antibiotic Awareness Week.

No community or civil society organization appears to be involved in the national AMR response; it is not known whether any are involved locally.

The recommended actions made at the national stakeholders' workshop in August 2024 on these topics are presented in Table 1.

Table 1. Discussion points and recommended actions on AMR and PHC policies and governance at the national stakeholders' workshop

Discussion on policies and governance

- Integration of AMR into national PHC policies and strategies
- AMR and PHC/universal health coverage governance mechanisms
- Civil society and professional association engagement in the AMR response (multisectoral involvement)

Opportunities	Challenges
Relevant laws, policies and plans are in place, such as the Rules for implementation of the formulary system, Rules for assessment of the rational use of drugs, the national road map on AMR and a national plan for IPC. Relevant governance structures can be used, such as the Committee for Medical and Pharmaceutical Control; the Formulary Commission, Patient Support and Internal Control Service; and the Association of Clinical Pharmacologists and Epidemiologists. An interdepartmental working group on AMR has been created, which includes clinical pharmacologists, health workers, microbiologists, professional associations and representatives of the Ministry of Agriculture. The group meets at least twice a year to discuss implementation of the national AMR road map, problems, solutions and plans. A mechanism is available for accreditation of health-care facilities, although it is not mandatory.	No key performance indicators for AMR-related issues for primary care facility administrators Some health-care personnel are not sufficiently trained or aware of AMR-related issues. Clinical pharmacologists have limited influence on prescribing practices. Not all primary care facilities have multidisciplinary teams. The teams do not always cover AMR, IPC or antimicrobial stewardship. Private clinics are not fully integrated into the national system, which affects, for example, collection of national data for monitoring prescriptions. No oversight of private primary care facilities.

Recommended actions

- **Review indicators and develop new indicators for AMS and IPC programmes in primary care facilities.** *(Leads: MoH; professional associations)*: Develop targeted key performance indicators related to AMR for primary care facility managers.
- **Develop a strategy for a national information and education campaign on AMR for policy-makers, health-care workers and the public.** *(Leads: MoH, professional associations, interdepartmental working group)*:
  - Plan and conduct informational and educational sessions on AMR for policy-makers, such as during national seminars or events (e.g. the upcoming PHC Congress).
  - Develop a media strategy to increase coverage of AMR and appropriate use of antibiotics in newspapers, working with local journalists.
- **Improve the competence of health-care managers at various levels of AMR control.** *(Lead: MoH. Partners: Ministry of Education; educational institutions)*
  - Define knowledge and skills required for primary care managers of multidisciplinary teams to effectively address AMR, implement AMS strategies and ensure best practices in IPC.
  - Include continuing education and training in regular interdisciplinary groups for primary care managers and practical on-the-job training for health-care professionals.

Image 3. National stakeholder workshop, Almaty, August 2024

2. Regulation of non-prescription antimicrobial sales and support for appropriate use and stewardship of antimicrobials at primary care facilities

2.1. Regulations to restrict non-prescription sales of antimicrobials

In Kazakhstan, medicines prescribed in public primary care facilities and covered by mandatory social health insurance are generally procured through a single purchaser, the State. The participants in the national workshop indicated that antibiotics are readily available in the country.

The sale of prescription drugs in Kazakhstan is regulated by the Code on the Health of the People of Kazakhstan and the Health Care System 2020 (with additions and amendments in 2024) *(34)*, in which over-the-counter sales of prescription drugs are prohibited. The national drug list is not currently based on the WHO AWaRe classification. The list of prescription drugs includes antibiotics and hormonal drugs, medicinal products containing narcotic drugs and psychotropic substances and medicines for the treatment of cardiovascular diseases. The prescription, registration and storage of medicines are regulated by No. RK HM-112/20202020 Rules for Prescribing, Recording, and Storage of Prescriptions, as approved by order of the Minister of Health and Social Development.

Generally, primary care facilities can prescribe oral antibiotics only from a list of five or six products, typically including amoxicillin, amoxicillin + clavulanic acid, azithromycin, doxycycline, ciprofloxacin and co-trimoxazole. Prescribed drugs are provided free by hospital pharmacies if they are in stock and on the primary care formulary. Any deviation from the formulary list must be justified and the cost of the medicine covered by the primary care facility. Primary care facilities also operate a loan and replenishment system with other facilities, such as if they do not have a particular drug in stock or have to use drugs that are close to expiry. During the WHO site visits in August 2024, the primary care facilities visited reported no shortages or stock-outs of listed antibiotics.

Despite the regulations that require prescriptions for antibiotics, it appears to be common practice in pharmacies to sell antibiotics over the counter, and the public expects to be able to buy them *(29)*. It also appears that pharmacists are aware of the risk of selling antibiotics without prescription *(29)*; however, customer demand for antibiotics (often for self-medication) may pressure pharmacists to sell antibiotics to retain their customers. Unpublished evidence indicates that there are barriers to enforcement of the regulations. For instance, some legal loopholes restrict the power of officials to collect evidence for enforcement purposes, and it has been reported that there has been limited enforcement of regulations.

In addition to better enforcement of regulations, particularly for Watch and Reserve antibiotics, public awareness, customer education and AMS in pharmacies are important, for which support could be provided by professional organizations. In primary care facilities, however, there appear to be insufficient numbers of clinical pharmacologists to monitor appropriate use and to promote AMS.

Most public primary care facilities use an electronic patient records system (e.g. Damumed is used in about 70% of primary care facilities) to record information on prescriptions and some information on diagnoses. Such systems, however, usually cover only outpatient prescriptions at public primary care facilities covered by mandatory social health insurance and not retail pharmacies or private primary care facilities. Strengthening health information systems by standardization and perhaps integration would improve the collection of national data and monitoring of appropriate use.

Analysis conducted by the Association of Clinical Pharmacologists of national sales data in 2023, with the ATC/DID method, showed that the five most frequently used antibiotics at primary care level were amoxicillin and amoxicillin + clavulanic acid, azithromycin, ciprofloxacin, ceftriaxone and doxycycline. Of the 10 most frequently consumed antibiotics in primary care, five were broad-spectrum Watch group

antibiotics.[1] This may suggest that the antibiotics on the national list of medicines should be reviewed to ensure that antibiotics are available for the most common infectious diseases in the country. Clinical treatment guidelines might also be reviewed to ensure appropriate prescription. Such reviews would ensure the availability of essential antibiotics, promote appropriate use and support enforcement of regulations on antibiotics.

2.2. Integration of appropriate use and AMS principles and activities in PHC policies

Legislation in Kazakhstan covers the rational use of medicines, thus strengthening the principles of appropriate use, as follows:

- rules for implementation of the formulary system, approved by order of the Minister of Health, on 6 April 2021 No. RK HM-28 "On approval of the rules for the implementation of the formulary system" (registered in the Register of State Registration of Regulatory Legal Acts under No. 22513); and
- rules for assessing the rational use of medicines, approved by order of the Minister of Health on 3 November 2020 No. RK HM-179/2020 "On approval of the rules for assessing the rational use of medicines" (registered in the Register of State Registration of Regulatory Legal acts under No. 21586).

In Kazakhstan, most common mild infectious diseases seen in primary care are managed in a polyclinic. Site visits and information provided at the workshop indicate that point-of-care rapid tests are not widely available at polyclinics. Blood samples are sent to larger polyclinics or district hospitals for analysis. A qualitative analysis of antibiotic use in several countries in Central Asia and eastern Europe *(29)* indicated that clinical tests and particularly sensitivity tests (unspecified) are important in Kazakhstan. If clinical tests cannot be conducted, doctors may choose a broad-spectrum antibiotic or wait and see how the condition develops.

In 59% of medical institutions in the country, there is no clinical pharmacologist responsible for ensuring the effectiveness and safety of pharmacotherapy *(17)*.

Community pharmacies must follow standard operating procedures and quality assurance measures, which are regulated nationally. Pharmacies must also perform regular self-inspections. A quality management system is a requirement for renewal of a pharmacy license *(28)*.

Insufficient published information was available to determine how appropriate use or AMS is integrated at primary care facilities. National clinical protocols developed by the National Scientific Centre for Health Development are reviewed every 3 years by national specialists and professional organizations, which receive some financial compensation for the work *(35)*. These protocols are available on the MoH website and should be made available in primary care facilities for doctors to consult. In district hospitals, audits may be undertaken by quality control teams to ensure that doctors adhere to guidelines, although it is not clear whether this is systematic and regular or is done only if a precipitating event occurs, such as a patient complaint or complications of treatment. Checks are also undertaken by administrators of the social health insurance, especially for treatments that deviate from clinical protocols or are particularly expensive. It is not known whether prescriptions and diagnoses at primary care facilities are systematically reviewed.

The Professional Association of Clinical Pharmacologists is developing antibiotic treatment guidelines based on the WHO AWaRe book. Some primary care facilities also appear to have their own resources on antibiotic use. The MoH should ensure that these resources are aligned with MoH clinical protocols.

Most primary care facilities use an electronic system to record information on prescriptions and some diagnoses. A diagnosis and prescription management system, Damumed, is used by about 70% of public primary care facilities. Thus, some data on AMR and AMS in primary care facilities are being collected.

[1] Unpublished analysis conducted by the Association of Clinical Pharmacologists.

Workshop participants indicated that public primary care facilities collect relevant data that are shared with municipal authorities and subsequently with the MoH. It was not clear, however, how the data are used at regional and national levels.

Electronic systems usually cover only outpatient prescriptions filled at public primary care facilities covered by the mandatory social health insurance and not those filled at retail pharmacies or in private primary care facilities. Work on integration and/or interoperability of these systems would strengthen health information systems and support collection of national data.

Primary care facilities appear to have access to aggregated AMR data for samples from patients that have been sent for microbiological testing. It is unclear whether these data are systematically shared with prescribers and/or with regional or national authorities.

The recommended actions formulated at the national stakeholders' workshop in August 2024 on these topics are presented in Table 2.

Table 2. Discussion points and recommended actions on regulating non-prescription sales of antimicrobials and supporting appropriate use of antimicrobials in primary care at the national stakeholders' workshop

Regulating non-prescription sales of antimicrobials and supporting appropriate use of antimicrobials in primary care

- Regulation of non-prescription sales of antimicrobials
- Initiatives to promote appropriate use of antimicrobials
- Immunization (Information session)

Opportunities	Challenges
Legal and regulatory frameworks have been established, although some should be updated (e.g. the order for rational use of medicines). An electronic prescription and drug management system is available (Damumed) to provide data on antimicrobial use. The national Association of Clinical Pharmacologists obtains national data on antimicrobial use from VIORTIS and has conducted basic analysis and reporting in the past few years. The data have been published and submitted to regional databases. Pharmacy inspections could strengthen control of the use of antibiotics and other antimicrobials, e.g. by mandating standard operating procedures for their dispensing, particularly for Watch and Reserve group antibiotics.	Commercial interests of pharmacies and pharmacists in drug sales. Limited enforcement of legislation and regulations. Furthermore, there is currently a moratorium on inspection of small businesses, including pharmacies, ostensibly to limit disruption of business operations and reduce the regulatory burden on small businesses and entrepreneurs. Pharmacists and the public are unaware of the threat of AMR. Patients lack the ability or willingness to visit primary care facilities in person, due, for example, to long waiting times to see a doctor and for an appointment. Insufficient clinical pharmacologists to monitor appropriate use and to conduct internal training on antimicrobial therapy.

Recommended actions

- **Strengthen systems to enable monitoring of antimicrobial use at national and facility levels to support appropriate use of antibiotics** *(Lead: MoH; Partner: Ministry of Information Systems)*
  - standardization, integration and interoperability of health information systems, including that of provision of medicines to outpatients Unified Pharmaceutical Retail Information System and Damumed, to ensure standardized information on diagnoses, treatment and prescriptions;
  - use of health and drug management information systems, creation of a traceable electronic system for prescription drugs and linking of health information systems used by primary care facilities with the unified system of the pharmaceutical retail sector; and
  - a national strategy to record data on all prescription drugs and sales in the health information system, eventually including retail pharmacies.
- **Increase the availability of essential Access antibiotics that are included on the national list and on the WHO Essential Medicines List.** *(Lead: MoH)*
  - Review the national list of medicines to ensure that the antibiotics on the list are appropriate and cover the most common infectious diseases in the country.
  - Assess the availability of these antibiotics (or a selected subset) in the country.
  - Develop a strategy to ensure and increase the availability of antibiotics (particularly essential Access antibiotics) on the WHO core list for organization of registration and importation, and incentivize domestic production of antibiotics.
- **Integrate the WHO AWaRe classification of antibiotics into regulatory documents and lists, and use the WHO AWaRe antibiotic book to review and update clinical protocols.** *(Leads: MoH, National Research Centre for Health Development)*
  - Identify and agree on the regulations and lists in which the AWaRe classification for antibiotics can be used.
  - Strengthen enforcement of restriction of over-the-counter sales of Watch and Reserve antibiotics.
  - Review clinical protocols, starting with those for most common diseases, and revise and update them as necessary in accordance with evidence-based guidelines, including those provided in the WHO AWaRe book.
  - Develop standard operating procedures for dispensing antibiotics, particularly Watch and Reserve antibiotics, to be included on pharmacy inspection checklists.

3. Community health promotion, education and engagement on AMR

3.1. Community health promotion of AMR

Iskakova et al. *(36)* conducted a cross-sectional study between October 2021 and February 2022 in eastern Kazakhstan on factors that influence antimicrobial consumption. Nearly two thirds of respondents (65.3%) had never heard about antibiotic resistance, and almost 92% agreed with the incorrect statement that a common cold requires antibiotics. The study indicates little knowledge and awareness about antibiotic use and resistance in Kazakhstan.

Implementation of the national road map to contain AMR 2023–2027 included a study on knowledge, attitudes and behaviour on AMR in 2022, with support from WHO *(37)*. Of 271 respondents who were asked about the reasons they had taken antibiotics most recently, 34% said it was for a cold, 25% for a sore throat and 23% for a fever. Indications of misconceptions about antibiotics were found: 65% of 553 respondents said that antibiotics kill viruses, and 70% said that antibiotics are effective against colds; however, 62% agreed that unnecessary use of antibiotics makes them ineffective.

With the WHO European Regional Office, the NCPH conducts activities annually during World Antimicrobial Awareness Week. NCPH specialists also organize and conduct training sessions, seminars, webinars and roundtable discussions on AMR for the media.

According to the 2023 Tracking AMR Country Self-assessment Survey report for Kazakhstan *(38)*, the country has a "demonstrated" level of raising awareness and understanding of AMR risks and response; however, school-age children and young people do not receive education on AMR.

3.2. Community engagement in access to high-quality AMR-related health products (including diagnostics, antimicrobials) and services

In Kazakhstan, the mandatory social health insurance package contains a wide range of medical services and medications, including antibiotics. Microbiological testing is covered by the insurance under a guaranteed volume of free medical care. It is not known whether point-of-care diagnostic tests are available and used.

Civil society organizations working on public health in Kazakhstan include the Aman-Saulyk Public Foundation, which promotes health and social protection. During the first months of the COVID-19 pandemic, Aman-Saulyk ran a hotline in Almaty to assist vulnerable populations *(39)*. It is not known whether other civil society organizations work on access to health care (including health products and services) or whether any patient advocacy organizations might do so. In general, primary care facilities have patient support departments or teams that address patient complaints. No information was available on the number or nature of such complaints.

The recommended actions formulated at the national stakeholders' workshop in August 2024 on these topics are presented in Table 3.

Table 3. Discussion points and recommended actions on community health promotion, education and engagement at the national stakeholders' workshop

Community health promotion, education and engagement

- Community health promotion on AMR
- Community engagement in access to high-quality AMR-related health products (including diagnostics and antimicrobials) and services

Opportunities	Challenges
Actions during World Antibiotic Awareness Week in Kazakhstan, which include webinars and conferences related to AMR with governmental and nongovernmental organizations, could increase community engagement. A large proportion of the population is covered for basic diagnostic services, including rapid tests, through the mandatory social health insurance package. Messages provided at the time of testing could educate communities.	Lack of a unified strategy for messaging for health education and awareness-raising. No financial support. No regular monitoring of antibiotic sales in pharmacies or private primary care facilities and no opportunities for the public to report or provide feedback to facility managers or regulatory authorities.

Recommended actions

- **Develop a strategy to increase public knowledge and awareness about AMR** *(Leads: MoH, NCPH, Salidat Kairbekova National Research Centre for Health Development. Partners: Committee on Religious Affairs, Ministry of Culture and Information)*
  - Engage with the NCPH, professional associations, faith-based organizations and others to disseminate information in communities on appropriate use of medicines. Use social media and local websites to disseminate information, including during World Antibiotic Awareness Week.
  - Establish a website on appropriate use of antibiotics *(Leads: MoH, professional associations, the interdepartmental working group).*
  - Prepare age- and cohort-appropriate educational materials on AMR and appropriate use of antibiotics, for example for preschools, schools, adults and the elderly.
- **Provide or earmark financial resources or a budget for awareness-raising in various target groups of the population.** *(Lead: NCPH. Partners: MoH, regional health departments)*
- **Develop a strategy to increase age-appropriate education and knowledge on AMR among students.** *(Lead: MoH. Partners: Ministry of Education and Ministry of Science and Higher Education)*

4. Pre-service and in-service training and support on AMR for primary care workers

4.1. Pre-service education on AMR for primary care workers, including community pharmacists

The standard curricula for medical and pharmacy students in Kazakhstan are regulated by the MoH, in accordance with national laws on education. Subjects such as microbiology, infection control and clinical practice are included, but there is no explicit mention of AMR or AMS *(40)*. Medical universities offer undergraduate education for general medicine, pharmacy, public health, dentistry, paediatrics and nursing. Doctors training in general medicine are taught about infectious diseases as a module in years 4 and 6 and epidemiology in a module on "Patient and Society" in year 5.

Postgraduate medical education is available to train doctors in various specialties. Some specialized postgraduate programmes mention AMR, especially those on infectious diseases, microbiology and public health, but there are no courses specifically on AMR. Infection prevention and control are also not covered specifically, although some courses contain elements. Hygienists and health-care specialists are trained in public health, the epidemiology of medical and preventive care and advanced epidemiology.

One of the components of the national plan "On the Improvement of the infection prevention and control system for 2022–2027" is creation of a national policy on education and training in IPC. The relevant indicators are the proportion of all health-care workers who are trained in prevention and control of HAI during a calendar year; the proportion of non-medical personnel in medical organizations who were trained in IPC; the proportion of educational organizations that teach the IPC programme with evidence-based medical material according to modules developed by the National Technical Group; and the proportion of the functions of infection control specialists that are standardized according to standard operating procedures and other requirements for standardization. The NCPH has therefore developed five educational programmes of 60 academic hours each on IPC for use in postgraduate education, which were approved at an Academic Council meeting on 20 March 2024.

4.2. In-service training and support on AMR for primary care workers, including community pharmacists

In Kazakhstan, doctors, nurses and pharmacists are required to engage in continuing professional development (CPD) programmes in order to renew their licenses and certificates *(28)*. The aim of the programmes is to keep health-care professionals up to date on the latest practices, information and skills relevant to their roles. Specific requirements for CPD, such as the number of hours and types of activities, are regulated by the MoH. For example, a specified number of CPD credits must be accumulated during a 5-year cycle. CPD courses are provided by medical universities, the Republican Centre for Health Development and professional associations. Professional associations also provide upgraded qualifications for CPD. The extent to which AMR-related topics are covered in CPD, to what extent and uptake of such courses are not clear.

The minimum requirements for IPC training and education of primary care workers are defined in the Manual on IPC in Medical Organizations (2023) *(41)*:

- IPC training is required for all clinical staff who provide direct patient care and for cleaning staff upon hiring.
- All clinical staff who provide direct patient care and cleaning staff must undergo practical training in the facility's IPC guidelines and standard operating procedures upon hiring.
- All IPC officers in facilities and district IPC programme staff must undergo specialized (advanced) IPC training.

To promote IPC and prevention of AMR, a community of practice was organized to improve the effectiveness of IPC in medical organizations throughout the country, with presentations every 2 weeks on practical issues for hospital epidemiologists, involving more than 200 participants. Other channels of engagement, such as forums and chat networks, have involved hundreds of participants.

To support professionals who prescribe or dispense, clinical pharmacologists at primary care facilities issue guidelines on appropriate use of antibacterial agents. In addition, the primary care facilities in Almaty that were visited in August 2024 reported that new staff receive training on working with antimicrobials. They also reported that primary care facilities provide cascade training, whereby doctors who are sent for training then train other doctors. Primary care workers are trained once every quarter, for example by professional associations.

Image 4. Groups discussion at national stakeholder workshop, Almaty, August 2024

The recommendations made at the national stakeholders' workshop in August 2024 on these topics are presented in Table 4.

Table 4. Discussion points and recommended actions on pre-service and in-service training and support on AMR for primary care workers at the national stakeholders' workshop

Pre-service and in-service training and support on AMR for primary care workers:

- pre-service education on AMR for primary care workers, including community health workers and community pharmacists and
- in-service AMR training and support for primary care workers, including community health workers and community pharmacists

Opportunities	Challenges
Medical universities offer undergraduate education in general medicine, pharmacy, public health, dentistry, paediatrics and nursing. Doctors training in general medicine have a module on infectious diseases in years 4 and 6 and a module on epidemiology, "Patient and Society", in the 5th year. Postgraduate medical education is available to train doctors in various specialties. IPC is not covered specifically, although elements are included in some courses. Hygienists and health-care specialists are trained in public health, medical and preventive care epidemiology, and advanced epidemiology. Medical colleges provide training for mid-level health-care professionals. Primary care workers in Kazakhstan generally have access to CPD to keep them up to date on the latest practices, information and skills relevant to their roles. Professional associations provide qualification upgrades as CPD. Open WHO training on AMS and IPC is available.	Insufficient attention to rational antibiotic use and IPC in the undergraduate medical curriculum. No training in pharmacovigilance for specialists in any field. Clinical pharmacology is not taught to residents in various specialties, and skills related to AMR are not included. Insufficient training in microbiology and AMR-related skills for mid-level health-care professionals. Topics covered during CPD are fragmented, not always practice-oriented, inconsistent and not interdisciplinary. Certificates from associations are not recognized. Furthermore, there are several associations at different levels.

Recommended actions

- **Standardize the topics and modules in undergraduate and postgraduate education in medical universities according to the competencies required for the prevention and control of AMR** *(Lead: MoH. Partners: Ministry of Education; medical universities and colleges)*
  - Assess gaps in medical curricula with the WHO AMR curriculum assessment tool *(42)*.
  - Change the educational programmes for specialists in general medicine, paediatrics, pharmacy and dentistry to include appropriate diagnosis and management of infectious diseases, rational use of antibiotics, pharmacology, microbiology, pharmacovigilance and appropriate use of antibiotics.

- **Provide regular interdisciplinary, practical on-the-job training for doctors and mid-level health-care professionals in AMR, with issuance of a recognized CPD certificate** *(Leads: MoH and NCPH. Partners: Ministry of Education; Association of Clinical Pharmacologists; potentially Public Health Agency of Sweden)*
  - Practical training might include simulations and clinical scenarios to improve practical skills in infection management.
  - Resources that could be used include Open WHO training in AMS and IPC.
  - Explore the possibility of collaborating with the WHO Collaborating Centre at the Public Health Agency of Sweden for practical support in AMS for primary care workers.
- **Strengthen primary care facility competencies to include AMR and AMS, either by having qualified clinical pharmacologists, pharmacists, microbiologists, and epidemiologists on staff or by ensuring that primary care facilities have access to competency-based support from elsewhere.** *(Lead: MoH. Partners: medical colleges)*

5. Mainstreaming AMR into PHC: Immunization

In line with the recommendations on vaccines of the Global Action Plan on AMR and the Action Framework annex of the Immunization Agenda 2030 *(43)*, a desktop analysis was conducted to determine whether the country has the full basic series of pneumococcal conjugate vaccine, *Haemophilus influenza* type B (Hib) vaccine, rotavirus vaccine and measles-containing vaccines and whether it is increasing coverage of influenza and typhoid conjugate vaccines.

The national immunization schedule in Kazakhstan includes vaccines against tuberculosis (bacille Calmette-Guérin), diphtheria, tetanus, pertussis, polio, Hib and hepatitis B; pneumococcal conjugate vaccine and measles-containing vaccine for children *(44)*. Seasonal influenza vaccines are available for adults and children. Kazakhstan is considering introduction of rotavirus vaccination into its national immunization programme *(45)*.

There has been no nationally representative, independent assessment of immunization coverage within the past 5 years. WHO and UNICEF estimates of immunization coverage in 2022 *(46)* indicate:

- pneumococcal conjugate vaccine 3: estimated national coverage was 98% (WHO coverage target, 90%);
- measles-containing vaccine 1: estimated national coverage was 99% according to reported administrative data (WHO coverage target, 90%);
- measles-containing vaccine 2: estimated national coverage was 97% for children at the nationally recommended age (WHO coverage target, 90%); and
- Hib3: estimated coverage was 99% (WHO coverage target, 90%).

These estimates may not be accurate, with indications of gaps in coverage, such as for measles-containing vaccines.

Coverage for influenza was estimated to be 12.09% in 2023 for all people > 6 months of age. Coverage was much higher in vulnerable populations, such as paediatric populations (79.3%), health-care workers

(90.06%), pregnant women (97.44%) and residents of long-term care facilities (84.46%) *(47)*.

The National Advisory Committee on Immunization makes recommendations on the schedule and target population groups for vaccination and on the introduction of new vaccines. Vaccination of children is free of charge, financed through Republican budget transfers to *oblasts* and is delivered by primary care providers and in health-care facilities throughout the country. Information on vaccination plans and programmes is provided by health-care providers to *oblast* health authorities and to the Committee for Sanitary-Epidemiological Control in the MoH.

The discussions at the stakeholders' workshop in August 2024 did not cover immunization. The information above was derived from published data and information provided by national focal points.

6. Conclusions and next steps

Kazakhstan has a long history of prioritizing and investing in PHC, and its primary care capacity is clearly strong, with good national and regional administration and reporting systems. The regulatory environment is robust, with a number of official orders and regulations for appropriate use of antibiotics and other AMR-relevant interventions. National and facility IPC regulations and practices appear to be strong. Nevertheless, some regulations and guidelines could benefit from review to ensure that they are in line with the latest evidence.

While non-prescription sales of antibiotics are officially banned, it is possible to obtain antibiotics without a prescription from pharmacies. This will continue to threaten progress in ensuring appropriate use of antibiotics, and enforcement of regulations should be strengthened. This could be made more feasible if undertaken in a stepwise manner, the priority being to monitor and restrict any non-prescription sales of Watch and Reserve antibiotics. The WHO AWaRe classification of antibiotics is a valuable resource for updating guidelines and protocols.

The health information systems could be strengthened and extended, perhaps with the support of the Public Health Agency of Sweden, to ensure standardized information on diagnoses, treatment and prescription in facilities. This would promote use of data in AMS efforts. Education of pharmacists and dispensing professionals is also important, along with broad education of the general public on AMR.

Human resources at primary care facilities appear to be adequate in general; however, education and knowledge on AMR for health-care providers should be strengthened and supported, with regular, practical opportunities to refresh their skills and knowledge. In addition, information on AMR in pre-service curricula for health workers could be strengthened. The recently published WHO AMR curriculum assessment tool for medical education *(45)* could be used to identify gaps in current medical curricula in Kazakhstan.

To ensure accountability and ownership, basic indicators related to AMR could be integrated into primary care management and practice, perhaps in association with a compensation model and benchmarking in different regions, if considered appropriate. WHO and partners could provide technical support in identifying and formulating suitable indicators.

In conclusion, there is a promising basis for integrating AMR interventions into the well-established PHC-oriented health system in Kazakhstan. In collaboration with the MoH and national stakeholders, targeted technical assistance could be provided by WHO and the WHO Collaborating Centre at the Public Health Agency of Sweden for implementation of a prioritized subset of the recommended actions in this report.

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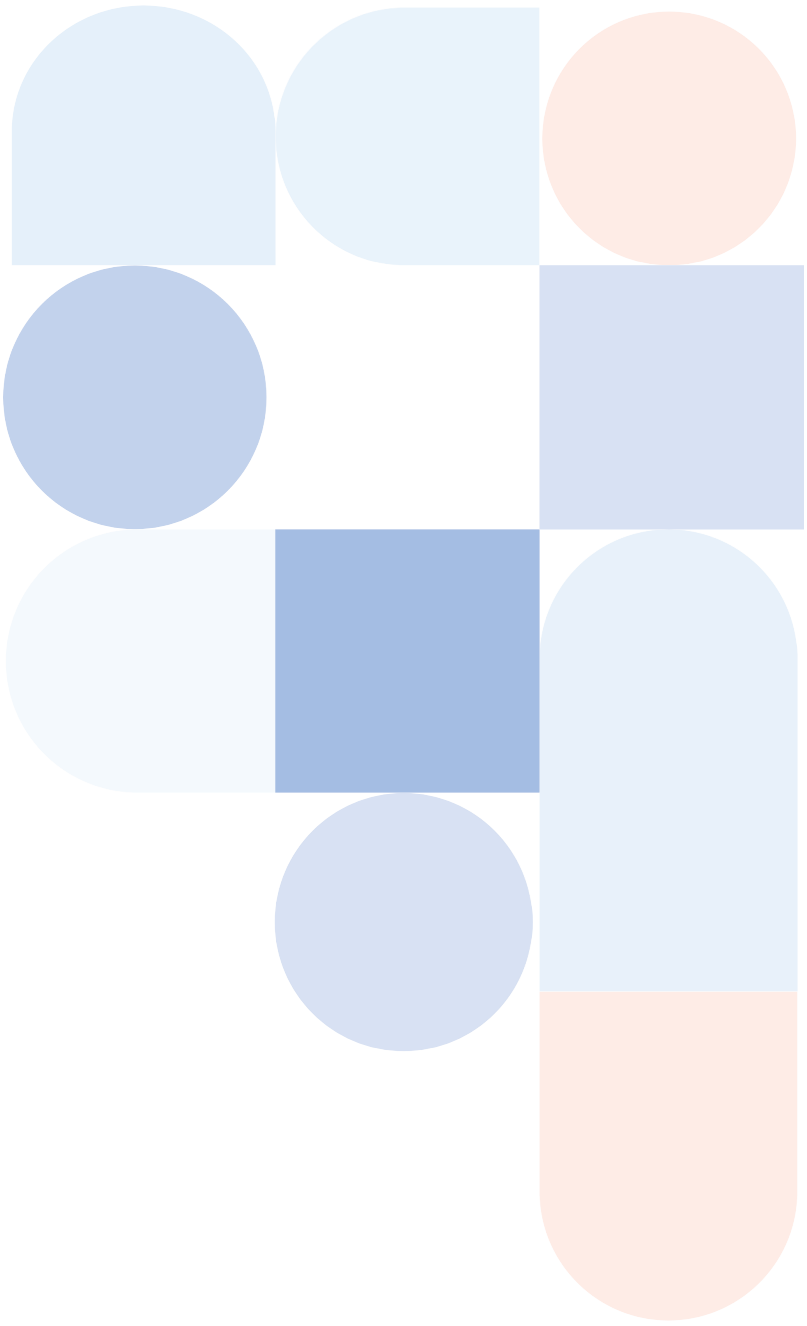


Annex 1. Agenda of the national workshop on mainstreaming antimicrobial resistance (AMR) into primary health care (PHC) in Kazakhstan. Almaty, 20–23 August 2024

Tuesday 20 August 2024		
Time	**Site visit group 1**	**Site visit group 2**
	Van to Best Western Hotel 08:30 Departure from hotel 08:45	Van to Best Western Hotel 08:30 Departure from hotel 09:00
9:30	Arrival at: Almaty city PHC # 36 Briefing with PHC leadership *Facility tour: outpatient department (OPD), pharmacy section, inpatient department (IPD), suppliers, infected waste management, etc.* Discussion	Arrival at: Almaty city PHC #5 Briefing with PHC leadership *Facility tour: OPD, pharmacy section, IPD, suppliers, infected waste management, etc.* Discussion
12:00	**Departure/Lunch**	**Departure/Lunch**
14:00	Arrival at: Konaev city Hospital Briefing with hospital leadership *Hospital tour: OPD, pharmacy section, IPD, suppliers, infected waste management, etc.* Discussion	Arrival at: Talgar Central District Hospital Briefing with hospital leadership *Hospital tour: OPD, pharmacy section, IPD, suppliers, infected waste management, etc.* Discussion
16:30	**Departure to hotel**	**Departure to hotel**

Wednesday 21 August 2024	
8:30	Registration *(WHO/ASEF)*
9:00–9:45	**Opening session** *Moderator:* Arnoldas Jurgutis *(WHO European Centre for PHC)* Opening remarks: ✓ Esmagambetova Aizhan - *Deputy Director, National Center for Public Health* ✓ Skender Syla – *Representative, WHO Country Office in Kazakhstan* ✓ Melitta Jakab - *Head of Office, WHO European Centre for PHC (tbc)* ✓ Objectives of the workshop - *Nienke Bruinsma, AMR Division, WHO headquarters* Group photo
9:45–10:30	**Background session** *Moderator:* Abzal Zhumagaliuly *(WHO Country Office in Kazakhstan)* ✓ The WHO people-centred approach: Core package of AMR interventions & the AMR-PHC project in Kazakhstan (15 min) - Nienke Bruinsma, *WHO headquarters* ✓ Update on Kazakhstan Roadmap for AMR (15 min) - Manar Smagul, Larissa Makalkina ✓ Update on Kazakhstan PHC system and opportunities & examples of integrating AMR interventions (15 min) – Aigul Kassymova ✓ Questions and answers
11:00	**Coffee break**

11:30–13:00	**Session: Site visit experiences** *Moderator:* Kateryna Soiak *(WHO Country Office in Kazakhstan)* ✓ Key findings and impressions from the site visit Group 1 (20 min) - Aigul Kassymova, Abzal Zhumagaliuly (WHO Country Office in Kazakhstan) ✓ Key findings and impressions from the site visit Group 2 (20 min) - Manar Smagul, Serena Chong, WHO headquarters) ✓ Key IPC measures for PHC (15 min) - Kateryna Soiak (WHO Country Office in Kazakhstan) ✓ Discussion **Introduction to group work** (5 min) - Nienke Bruinsma, *WHO headquarters*
13:00	**Lunch**
14:00–15:30	**Session: Introduction to group work** Evidence review presentation from focus groups 1 and 2 (10 min) – Serena Chong *(WHO headquarters),* Abzal Zhumagaliuly Practical example focus area 1 (10 min) - Lazzat Yesbatyrova, Nurgul Aldiyarova
15:30–17:00 *30-min coffee break*	**Breakout group discussions for focus group 1 and 2** *Moderators group 1:* Larissa Makalkina, Lazzat Yesbatyrova *Moderators group 2:* Sholpan Kaliyeva, Gaukhar Agazhayeva Short presentation on WHO technical guidance, groups 1 and 2 Discussions based on guidance questions from evidence review Filling in template on Opportunities, Challenges and Recommendations
17:00	**Wrap up**

Thursday 22 August 2024	
9:00–10:00	**Session: Sharing experiences** *Moderator:* Abzal Zhumagaliuly *(WHO Country Office in Kazakhstan)* ✓ Presentation of STRAMA (20 min) - Stephan Stenmark, Wenjing Tao *(WHO Collaborating Centre, Sweden)* ✓ Presentation on PHC and universal health coverage (20 min) - Arnoldas Jurgutis *(WHO European Centre for PHC)* ✓ Discussion
10:00–11:00	Continued **Breakout group discussions for focus groups 1 and 2**
11:00	**Coffee break**
11:30–13:00	**Session: Introduction to group work** Presentation of the evidence review by focus groups 3 and 4 – 10 min Serena Chong *(WHO headquarters)*, Abzal Zhumagaliuly *(WHO Country Office in Kazakhstan)* Practical example focus area 3 (10 min) - Kuanysh Yergaliyev Practical example focus area 4 (10 min) - Larisa Makalkina, Nurgul Aldiyarova
13:00	**Lunch break**
14:00–17:00 *30-min coffee break*	**Breakout group discussions for focus groups 3 and 4** *Moderator group 3:* Kuanysh Yergaliyev *Moderators group 4:* Nurgul Aldiyarova, Manar Smagul ✓ Short presentation on WHO technical guidance for groups 3 and 4 ✓ Discussions based on guidance questions from evidence review ✓ Filling in template on Opportunities, Challenges and Recommendations
17:00	**Wrap up**

Friday 23 August 2024	
9:00	**Bingo!**
9:00–10:30	**Session: Reporting back to plenary** Presentation of findings and recommendations – 15 min. Focus group 1 Discussion Presentation of findings and recommendations – 15 min. Focus group 2 Discussion
10:30–11:00	**Coffee break**
11:00–12:30	Continued. Presentation of findings and recommendations – 15 min. Focus group 3 Discussion Presentation of findings and recommendations – 15 min. Focus group 4 Discussion
12:30–13:30	**Closing session** Next steps based on recommendations - *TBD, WHO* Closing remarks - Esmagambetova Aizhan Serikbaevna*, Deputy Director NCPH*
13:30	**Lunch**

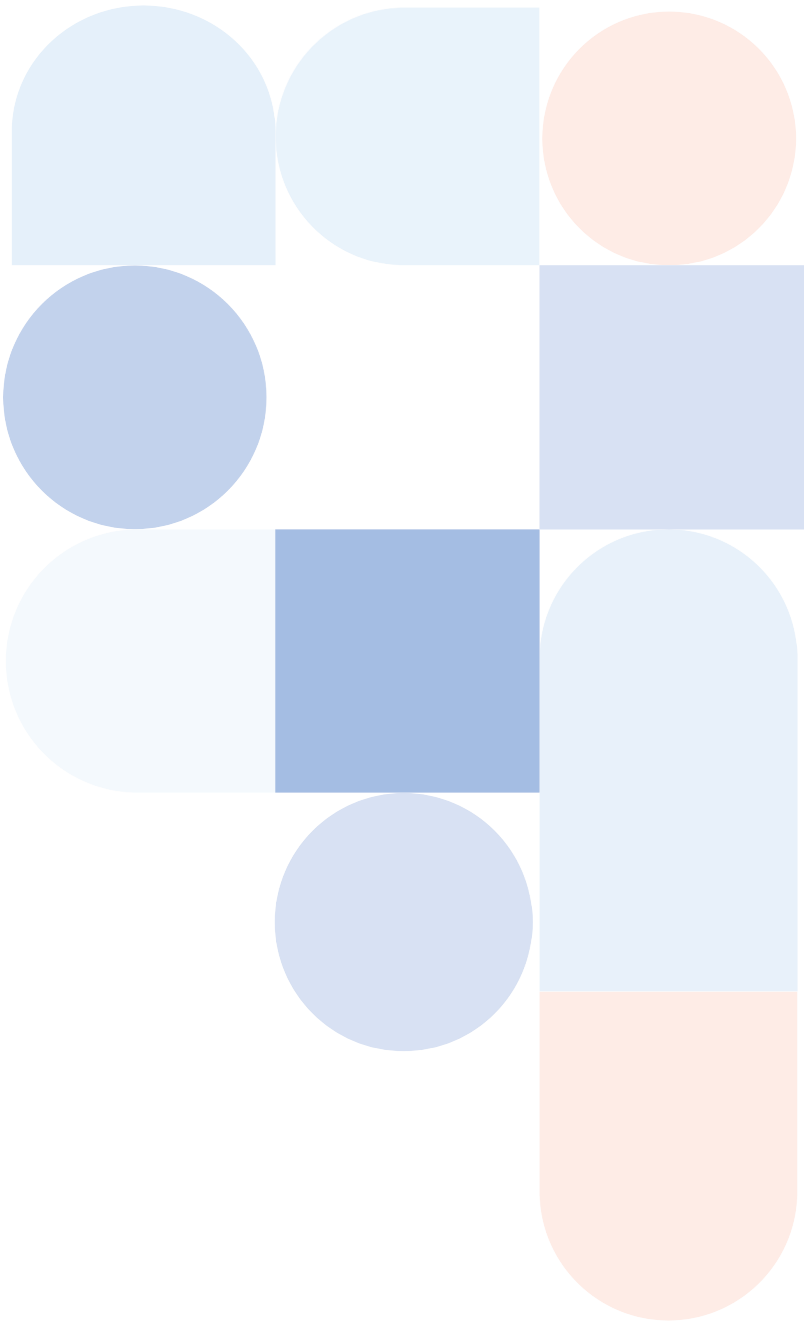
Annex 2. List of participants

Participants	Organization/Affiliation
Dina Abbasova	Scientific and Practical Centre for Sanitary and Epidemiological Examination and Monitoring
Yeldana Abenova	Multidisciplinary Hospital of Konaev
Zhamilya Abeuova	Enbekshikazakh Multidisciplinary Interdistrict Hospital
Gaukhar Agazhayeva	National Centre of Public Health, Ministry of Health
Nurgul Aldiyarova	Professional Association of Clinical Pharmacologists and Pharmacists of Kazakhstan
Kulzhakhan Baitoreyeva	City Polyclinic No.5, Zhambyl region
Ongarsyn Bayuzakov	Talgar Central District Hospital
Margarita Bisenova	City Polyclinic No. 4 Kostanay
Amangul Duisenova	S.D. Asfendiyarov Kazakh National Medical University
Zara Dusenova	Department of Public Health of Almaty
Galymzhan Esenaliev	Talgar Central District Hospital
Aizhan Esmagambetova	National Centre of Public Health, Ministry of Health
Madina Ismailova	City Polyclinic No. 36, Department of Public Health, Almaty
Saltanat Kakibayeva	Ministry of Health
Aidana Kaliyakparova	Public Foundation Kazakh Scientific Society for the Study of Intestinal Diseases
Sholpan Kaliyeva	Karaganda Medical University
Aigul Kassymova	Director, Republican Centre for Primary Health Care
Aigul Kylyshbaeva	Primary Health Care Association
Larissa Makalkina	Astana Medical University
Gulraykhan Miyanova	National Centre for Drug and Medical Device Expertise
Shattyk Mukhtar	Salidat Kairbekova National Research Centre for Health Development
Assylzat Mukhatayeva	Primary Health Care Department, Almaty Region Health Administration
Yersaiyn Mussabayev	Clinical pharmacologist, Republican Centre for Primary Health Care
Aizhan Nurllin	Mediker Caspian Clinic
Aizhan Rysbekova	City Polyclinic No. 5, Karaganda
Aizhan Sadyrbayeva	Kazakhstan Association of Healthcare Managers
Erlan Sarzhanov	Multidisciplinary Hospital of Konaev
Samat Satayev, National	Centre for Drug and Medical Device Expertise
Togzhan Shomanova	G. Sultanov Pavlodar Regional Hospital
Manar Smagul	National Centre of Public Health, Ministry of Health
Gulnara Takenova	Talgar Central District Hospital
Bota Urimbaeva	City Clinical Infectious Disease Hospital
Bibikhan Yeraliyeva	Central Clinical Hospital No. 12
Kuanysh Yergaliyev	Kazakhstan Association of Healthcare Managers
Shynar Yermekova	Health Department, Aktobe Region
Lazzat Yesbatyrova	Salidat Kairbekova National Research Centre for Health Development
Zhanar Yessengalieva	City Polyclinic No.1, West Kazakhstan
Aziz Yuldashov	"Zhurek" Limited Liability Partnership
Gulmira Zhanabaeva	Ordabasy Central District Hospital
Akniyet Zharylkassynova	National Centre of Public Health, Ministry of Health, Kazakhstan
Gulnur Zhumabekova,	City Polyclinic No. 5, Department of Public Health, Almaty

WHO Collaborating Centre, Public Health Agency of Sweden
Stephan Stenmark
Wenjing Tao

Asia–Europe Foundation
Riko Kimoto
A'in Razak

WHO staff	
Nienke Bruinsma	WHO headquarters
Serena Chong	WHO headquarters
Deborah Tong	WHO headquarters
Danilo Lo Fo Wong	WHO Regional Office for Europe
Melitta Jakab	WHO European Centre for Primary Health Care
Arnoldas Jurgutis	WHO European Centre for Primary Health Care
Kateryna Soiak	WHO Country Office in Kazakhstan
Skender Syla	WHO Country Office in Kazakhstan
Abzal Zhumagaliuly	WHO Country Office in Kazakhstan



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