

## Recollections

## Accelerating the Control and Elimination of Major Parasitic Diseases in China — On World NTD Day 2024

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Neglected tropical diseases (NTDs) are a group of diseases associated with poverty that affect over 1 billion people worldwide (1). On May 31, 2021, the World Health Assembly (WHA) officially recognized January 30 as World Neglected Tropical Diseases Day through decision *WHA74(18)*. This designation aims to raise awareness about the severe impact of NTDs on disadvantaged populations and to mobilize support for control, elimination, and eradication efforts. The theme for World Neglected Tropical Diseases Day 2024 is “Unite, Act, Eliminate.” In November 2020, the 73rd World Health Assembly endorsed the report “Ending the neglect to attain the Sustainable Development Goals: a road map for neglected tropical diseases 2021–2030” (2). This comprehensive report establishes global targets and milestones for the prevention, control, elimination, or eradication of 20 diseases and disease groups, aligned with the Sustainable Development Goals. Three primary pillars will guide global efforts in achieving these targets: 1) accelerating programmatic action, 2) intensifying cross-cutting approaches, and 3) promoting country ownership through changes in operating models and culture. The roadmap sets the elimination of schistosomiasis, visceral leishmaniasis (VL), and soil-transmitted helminthiasis (STHs) as public health problems and outlines control measures for echinococcosis, foodborne trematodiasis, and taeniasis/cysticercosis in China. In this paper, we review the progress and accomplishments in the control of major parasitic diseases in China over the past decade and analyze the ongoing challenges in achieving the elimination targets outlined in the World Health Organization (WHO) roadmap. We discuss the latest advancements, obstacles, and key tasks in the control of major parasitic diseases in China, aiming to provide insights into the realization of the targets outlined in the *WHO roadmap for neglected tropical diseases 2021–2030* and the *Outline of the Healthy China 2030 Plan*.

### PROGRESS TOWARD THE CONTROL AND ELIMINATION OF MAJOR PARASITIC DISEASES

China, once heavily endemic for NTDs with a high disease burden, has made significant progress in disease control. The WHO declared lymphatic filariasis (LF) elimination in China in 2007, making it the first country to achieve this milestone (3). By the end of 2023, transmission interruption of schistosomiasis was achieved in all endemic areas of China (4). The number of schistosomiasis cases decreased from 240,597 in 2012 to 28,568 in 2022, representing an 88.13% decline, and no new local infections in humans, cattle, or snails have been reported since 2015 (5–6). After a national epidemiological survey of echinococcosis was conducted in 2012, integrated interventions focusing on controlling infection sources in endemic areas led to a continuous decline in prevalence (7). The prevalence rate of echinococcosis in endemic areas was 58.35 per 100,000 in 2022, marking a significant 79.29% reduction compared to the prevalence rate of 280 per 100,000 in 2012 (8). In most endemic areas of China, the prevalence of STHs and foodborne trematodiasis has been maintained at a low level (9). Three national surveys on STHs have been conducted in China, and the infection rate has dropped from 53.58% in the first survey (1988–1992) to 4.49% in the third survey (2014–2016) due to strong interventions such as mass drug administration, health education, and environmental improvement (10). Data from national surveillance sites indicate that the prevalence of STH infection rate in China dropped from 2.46% in 2016 to 0.84% in 2020 (11). Additionally, the reported cases of VL decreased from 322 in 2016 to 239 in 2022. The overall prevalence of VL in humans remained low throughout China (12–13), although there were local areas where mountain-type zoonotic VL resurged (14). Overall, China is making significant strides toward achieving the 2030 targets outlined in the *Outline of Healthy*

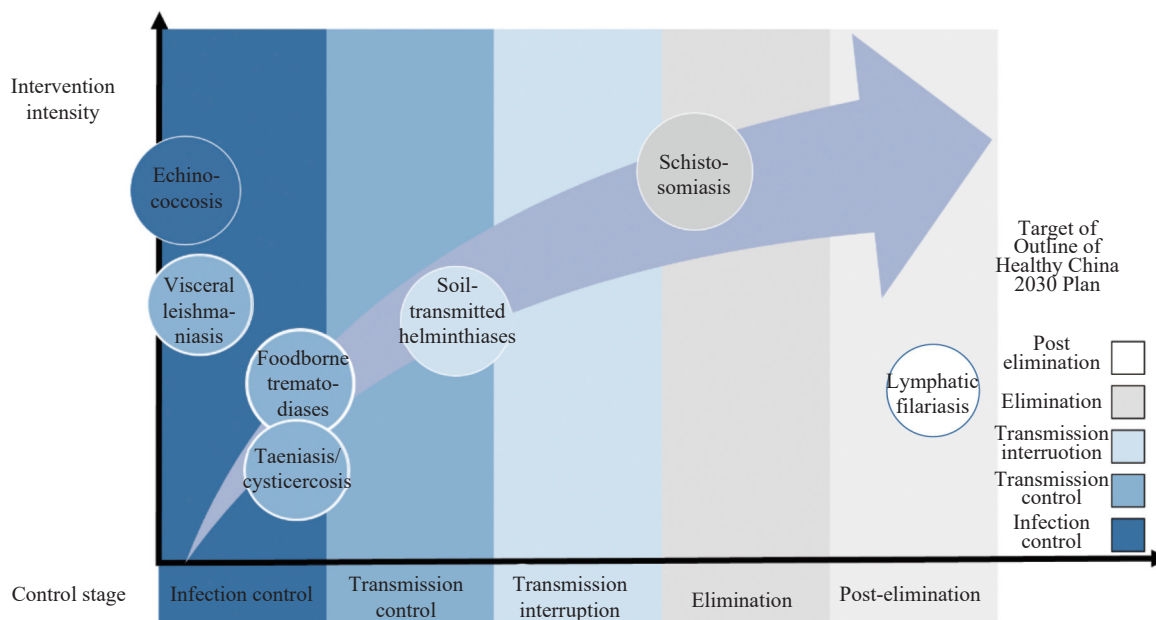


FIGURE 1. Progress and targets of major parasitic disease control programs in China.

China 2030 Plan (Figure 1).

## EXPERIENCES LEARNED

### Program Orientation — The First Cornerstone of the New Roadmap: Accelerating Program Action

In order to enhance the management and elimination of prevalent parasitic diseases, the Chinese government has developed disease control programs that take into account socioeconomic and epidemiological factors. These programs are designed to address specific diseases such as schistosomiasis, malaria, echinococcosis, soil-transmitted helminth infections (STHs), foodborne trematodiasis, and VL. Targeted measures and technical guidelines have been implemented to ensure the sustainability of these programs. Regular evaluations have been carried out to assess the effectiveness of interventions and monitor the progress of disease control.

The *Outline of Healthy China 2030 Plan*, released by the Chinese government in 2016, set an ambitious goal of eliminating schistosomiasis and controlling echinococcosis in all disease-endemic counties by 2030. In June 2023, the *Action Plan to Accelerate the Achievement of Schistosomiasis Elimination Goal (2023–2030)* was jointly formulated by 11 ministries of the Chinese government. This plan provides detailed targets over three periods and emphasizes

major countermeasures to eliminate schistosomiasis in China. These programs and action plans serve as the foundation for achieving the targets outlined in the new strategic plan.

### Integrated Control — The Second Cornerstone of the New Roadmap: Improving the Development of Cross-Disciplinary Tools

An integrated strategy was implemented to control major parasitic diseases, focusing on the control of infection sources. This strategy employed classified guidance and scientific control principles, and involved multisectoral and multidisciplinary collaborations. Resources from the health, agricultural, forestry, water resource development, land resources, and education sectors were mobilized to implement various measures, including disease surveillance, management of animal reservoir hosts, environmental health treatment, safe water supply, vector control, and health education. These comprehensive efforts were aimed at effectively combating major parasitic diseases (15).

Based on the characteristics of transmission, integrated strategies have been implemented to control parasitic diseases. For the control and elimination of schistosomiasis, the agricultural sector has implemented measures such as replacing farming cattle with machines, confining domestic animals, and prohibiting grazing to regulate infection sources. The

water conservancy and forestry sectors have employed engineering measures to control intermediate host snails by hardening ditches, modifying environments, and planting forests, suppressing snails' survival. To control echinococcosis, the agricultural sector has strengthened livestock enclosure measures and standardized slaughter practices to manage the infection source in animals. The public security department has intensified efforts to eliminate infected and stray dogs for VL control. In addition, the government has made active improvements in water supply systems and sanitation facilities to prevent and control soil-transmitted helminth infections. These countermeasures resulted in significant improvement in the supply of safe water, hygiene and sanitation of communities, a good social atmosphere supporting interventions, and interruption of schistosomiasis transmission.

Furthermore, collaborative efforts between universities and research institutions have led to the development of various innovative tools and techniques for the detection of parasites, including molecular detection assays, gene traceability techniques, vector characterization, and identification assays. Additionally, intelligent field control and surveillance-response systems have been implemented, along with the development of effective antiparasitic agents and molluscicides. These advancements have been integrated into national parasitic disease control programs, marking a significant milestone in our progress toward achieving the objectives outlined in the new road map (16).

### **Organization and Leadership — The Third Cornerstone of the New Roadmap: Changing the Operation Pattern and Cultivation**

Since the establishment of the People's Republic of China, the control of parasitic diseases has been a top priority for the Chinese government. Measures include the development of annual governmental working plans that incorporate parasitic disease control programs, financial support from the central government, and the establishment of a comprehensive mechanism for government leadership, multisectoral collaborations, and joint prevention and control strategies. These efforts have included the allocation of human resources, as well as financial and material support, to enhance disease control capabilities. This has involved the establishment and improvement of

disease surveillance networks in high-risk endemic areas, the development of a national-provincial-county level diagnostic laboratory network, and the implementation of major control and surveillance projects for parasitic diseases at a national level (17). In addition, the involvement of corporations, universities, institutions, and non-governmental organizations has been crucial in mobilizing collective efforts and creating an environment conducive to joint prevention and control. This collaborative approach has been instrumental in achieving the targets outlined in the new roadmap.

## **MAJOR CHALLENGES TO ACHIEVE THE TARGETS SET IN THE NEW ROADMAP**

Despite the significant progress achieved in the implementation of major parasitic disease control programs in China, there are still numerous challenges that need to be addressed in accordance with the targets established by the WHO road map for neglected tropical diseases 2021–2030 and the *Outline of Healthy China 2030 Plan*. These challenges include global climate warming, ecological environmental deterioration, and unchanged living conditions and behaviors (18). First, the transmission of major parasitic diseases is influenced by a wide range of factors, and the progress of control programs for these diseases remains weak (19). Consequently, there have been occasional re-emergence or resurgences of major parasitic diseases. Second, the feasibility and effectiveness of interventions against different diseases vary across regions. For instance, implementing control activities against parasitic diseases in agricultural and pasture areas of western China poses difficulties, and the control and surveillance of taeniasis/cysticercosis, scabies, and other ectoparasitic diseases need improvement. Lastly, as China approaches the pre-elimination stage for major parasitic diseases, there is an increasing demand for precision control methods. Innovative strategies, interventions, and techniques are urgently required to expedite disease elimination.

## **PERSPECTIVES**

In line with the *WHO road map for neglected tropical diseases 2021–2030* and the *Outline of Healthy China 2030 Plan*, targeted control programs for parasitic diseases are developed and executed with the guidance

of the government. These programs involve collaboration across multiple sectors, integration with rural revitalization projects, and effective social governance. Additionally, tailored measures are implemented based on specific local conditions to effectively control and eliminate major parasitic diseases.

For each neglected tropical disease, specific strategies have been identified in national control programs implemented in endemic areas. While transmission interruption has been achieved for some diseases, the strategy for eliminating schistosomiasis has been updated to focus on infection source control and strengthening snail control in key environments, as outlined in the *Action Plan to Accelerate the Achievement of Schistosomiasis Elimination Goal (2023–2030)*. In endemic areas of echinococcosis, a comprehensive control strategy that prioritizes infection source management while integrating standardized investigation and treatment for patients, intermediate host prevention, and control is recommended to advance the control process. For VL, specific measures should be implemented based on different epidemiological characteristics. In endemic areas of the Mountainous Sub-type of Zoonotic VL, strategies should include dog regulation, vector control, and patient treatment. For Anthroponotic VL, emphasis should be placed on identifying and treating patients along with vector control. In the Desert Sub-type of Zoonotic VL, it is important to treat infected individuals and implement protective measures for the population, along with vector control. To control soil-transmitted helminthiasis and foodborne parasitic diseases, a comprehensive control strategy should be adopted. This strategy should focus on health promotion as a guiding principle, along with infectious source management. It should involve implementing preventive measures such as health education campaigns, chemotherapy for humans and animals, improvements in water supply systems and sanitation facilities, and enhanced food safety management through national monitoring systems.

To effectively address the three major challenges in achieving the targets outlined in the new road map, we recommend actively promoting the application of the One Health concept (20). This concept encompasses Human, Animal, and Environmental health and aims to optimize support for control interventions and technical tools. By consolidating these three cornerstones, we can accelerate the elimination of major parasitic diseases in China.

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