CHAPTER SEVEN

Challenges and way forward

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Abstract

Schistosomiasis, helminthic zoonoses and NTDs constitute a considerable majority of the diseases of poverty in the world. The RNAS$^+$ targeted zoonoses are not only problems to human and animal health, but also cause poverty in 1 billion poor livestock keepers as well as result in 2.3 billion cases of human illness and 1.7 million human deaths a year. The gaps in research of those targeted zoonoses are urgently addressed by identifying the research priority, fulfilled by improving the multisectoral cooperation and strengthening the interventions in the control programme.

1. Introduction

Schistosomiasis, helminthic zoonoses and NTDs constitute a considerable majority of the diseases of poverty in the world. Discussions in annual RNAS$^+$ meetings stress the necessity of the socio-behavioural aspect of transmission of these diseases hence the advocacy for understanding affected

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communities' knowledge, attitudes and practices to be able to formulate appropriate and acceptable strategies. Starting with the implementation of the EcoHealth approach, RNAS$^+$ continuously espouses the collaboration of various disciplines such as Veterinary Public Health, Sanitation, Human Health, Social Sciences, Education, Economics and Agriculture for the successful research and control and eventual elimination of all its target diseases(Malone et al., 2010; Yang et al., 2010).

Zoonotic diseases are not only considered as one of major problems in public health and animal health, but also regarded as an obstacle in the pathway out of poverty for 1 billion poor livestock keepers. These diseases also cause 2.3 billion cases of human illness and 1.7 million human deaths a year. In this light, RNAS$^+$ continues to address these issues through researches, interdisciplinary training, and advocacy for collaboration and multisectoral cooperation using the RNAS$^+$ platform, it is important to identify gaps in research and control for RNAS$^+$ targeted diseases to identify research priorities in future collaborative researches (Zhou et al., 2002, 2015).

1.1 Gaps in the research, control of schistosomiasis and other RNAS$^+$ target diseases

The RNAS$^+$ was founded mainly for the following objectives: (1) coordinate and secure support for research on surveillance and control of schistosomiasis transmission in humans and animals; (2) disseminate information about ongoing research and training activities; (3) develop standardized protocols for infection and disease surveillance; (4) evaluate current control strategies and assign regional research priorities; and (5) share plans for new studies and explore the potential for international collaboration (Zhou et al., 2008).

Its annual regular meetings were marked with presentations of research results on various aspects of schistosomiasis and other helminthic zoonoses such as clonorchiasis, opisthorchiasis, fascioliasis, paragonimiasis and taeniasis/cysticercosis and in more recent years also of NTDs such as lymphatic filariasis, soil-transmitted helminthiases, and food-borne trematodiases. In the last 20 years of RNAS$^+$, great progress has been achieved in the control and prevention of schistosomiasis with significant number of endemic areas in China, Indonesia, the Philippines, Laos and Cambodia reaching near elimination levels. New research needs have been realized with this development such as the urgent demand for development of more sensitive diagnostic methods to be used in surveillance and monitoring of schistosomiasis in areas that have reached near-elimination levels (Charlier et al., 2018; Olveda et al., 2010).

Recognizing the limitation of preventive chemotherapy alone in achieving elimination, a response to the urgent call for multifaceted response that would target the animal reservoir hosts, the snail intermediate host and the environment that perpetuates transmission, took the form of the EcoHealth approach involving multidisciplinary and multisectoral components. Techniques for surveillance, monitoring and evaluation continue to be developed in order to achieve elimination successfully. Standardization of surveillance techniques and assessment of intervention strategies remain an urgent plea for RNAS^{+} to respond to. GIS and RS have been proved to be powerful tools for surveillance and monitoring but guidelines are still needed for their specific applications in various settings.

Vaccine development remains a possible option for prevention of re-infection complementing traditional methods such as preventive chemotherapy, snail control, environmental sanitation and health education. Mathematical modelling is continuously explored to elucidate how these various intervention measures can contribute to achieve the goal of elimination given a specific setting.

In an intensely dynamic socio-ecological environment, both ongoing and future events of this nature pose imminent threats to possible spread of schistosomiasis to other nonendemic areas visibly offsetting the gains that have been accomplished in many endemic areas. The Three Gorges Dam in China is forecasted to exert a massive change that could trigger widespread economic, social, ecologic and health changes (Poulin, 2002). There have been repeated warnings on the possible conditions created by the dam that favour perpetuation of schistosomiasis especially survival, reproduction and spread of the *Oncomelania* snails. The possibility of increase in snail habitats is also predicted as a result of the implementation of the policy of antiflooding of "disrupting banks to catch up more water, returning crop land into wet land of lake, relocation of new towns to settle people in high land".

The large scale water resources developments underway in Lao PDR also cause concern for possible emergence of snail habitats for *Schistosomiasis mekongi* and other snail-borne trematodes. In China, there is a call for establishment of regional intersectoral collaboration among the agricultural, health and hydrological sectors in the Yangtze River valley of the People's Republic of China, in order to block expansion and spread of the disease after flooding events.

In the early years of RNAS^{+}, Dr. Arve Lee Willingham then with the Danish Bilharzhiasis Laboratory saw the value of stressing the impact of schistosomiasis on food security and agricultural output through its effect on

farmers and fishermen and consequently on animal production and health. Dr. Willingham named three C's that are essential in surveillance and control of schistosomiasis viz. communication, cooperation and coordination.

The expansion of the scope of RNAS$^+$ target diseases to other helminthic zoonoses and NTDs also elucidated specific research needs in these diseases such as research on burden of disease to surface the importance of cancer-causing diseases such as clonorchiasis and opisthorchiasis. The success in elimination of lymphatic filariasis needs to be shared with other member countries for their guidance and reference. Report of schistosomiasis in Myanmar needs to be confirmed and further elucidated to forewarn other countries which might face the same risk of emergence of this disease.

The benefits of intersectoral collaboration are numerous starting with how sectors can avail of creative synergies and accomplish mutual results that could be impossible for them to accomplish on their own alone. Combined interests, resources and responsibility can result in more sustainable solutions for coping with risks. Collective actions of the various collaborating sectors can bring about more innovative approaches to the process of policy design, action planning, policy implementation and monitoring and evaluation (Turner et al., 2015; Zhou et al., 2002).

1.2 Gaps possibly in the structure and operation of RNAS$^+$

1.2.1 Funding problems

The initial meetings of RNAS$^+$ were funded by WHO/TDR. Subsequent meetings were supported by particular government agencies of host country and funds from ongoing multi-country projects from IDRC and Mekong Subregion Project. Suggestions to explore other sources of funds to maintain the operations of RNAS$^+$ especially its regular meetings have always been in the agenda of its annual meetings. Possible fund sources such as FAO, ADB, World Bank, IFAD (International Foundation for Agricultural Development) have been proposed including the use of a more aggressive marketing of the organization to be able to obtain grants for multicountry and multidisciplinary researches similar to the IDRC project. Other recommendations include integrating malaria and NTDs in RNAS$^+$ proposals; stressing poverty alleviation through control of infections diseases in proposals; conducting social marketing to understand what donors want and lastly organizing international symposia that would generate funds from registration fees.

1.2.2 Role of RNAS$^+$

Dr. Feng Zheng, the first president of the network proposed the following nature of the RNAS$^+$: that the organization should be an open network, not a closed circle that will be tasked with (1) disseminating knowledge and available technological information for further development; (2) application of new advancement in control programmes; (3) consolidating the network to bring more scientists in; (4) promoting intersectoral, interregional, and international collaboration; and (5) converting knowledge into action (Zhou et al., 2002).

On the issue of how the mandate of the RNAS$^+$ is distinguished from that of government institutions, RNAS$^+$ is suggested to take a role as a hub for government and researches to link for better utilization of resources. Furthermore, the activities of RNAS which should be looked at as a service organization, are expected to always be in consultation with the national control programme of the concerned country. The network also continues to coordinate with WHO—WPRO and endeavours to help the Ministry or Department of Health of the member countries.

The network also serves as both an information group and advisory group that is dependent on expert committees for proposal and development of policies, guidelines on research standards, research thrusts and research-able areas among others.

1.2.3 Network consolidation and expansion

In one annual network meeting, representatives from member countries recognized the need to strengthen communication among scientists engaged in schistosomiasis research, the importance of regular information exchange as well as the sharing of technologies involving control and surveillance. Dr. Remigio Olveda, two-time president of the proposed that the network device a way to bring together all those who have worked on ultrasound so they can come up with answers related to standardization of the protocol using ultrasonography.

Dr. Kevin Palmer of WHO in 2005, referred to RNAS as the most active network being supported by WHO at present. He joined the other speakers in calling for changes in the seven-year old network such as expanding its vision, looking into other areas of training and recruiting younger researchers and new control people. He warned about the resurgence of the disease in China and the waning importance and priority given to the disease in the Philippines. He stressed the need to revise objectives of the network to make it stronger, attractive and interesting to donors.

Other suggestions to consolidate and expand the network included the following. Invitations to meetings should be extended to officials of international organizations such as WHO, FAO, ILRI and others. The linkage with the RNAS$^+$ African counterpart should be revived and intensified.

Dr. Banchob Sripa of Thailand who served as president of RNAS$^+$ previously encouraged more communication with member countries through an improved website or even a Facebook account. This is also a way of gaining more visibility for the network. It was stressed that there is a need for suggestions and comments on how to improve the annual meetings.

There was a move to organize an email group to continue discussion among members about issues like surveillance, criteria for elimination and others, problems in MDA and other challenges encountered by member countries in the control and elimination of NTDs. Dr. Bergquist, one of the international advisors will moderate the group discussion on line and Dr. Lydia Leonardo, RNAS$^+$ secretary will document the discussion.

1.2.4 Research in RNAS$^+$ and training

RNAS$^+$ has undertaken multicountry and multidisciplinary researches in the past that contributed to advances in the knowledge about its target diseases leading to improvements in control. Increasing globalization and climate change that negatively impact the health, economy and socio-cultural aspects not only of RNAS$^+$ member countries but of the world in general necessitate research to mitigate the profound effects of these two global changes.

Collaborative researches and training courses are urgently called for since the network has constantly been in the forefront of research, information dissemination and translation of results for improvement of particular health programmes.

In anticipation of the changing of guards soon, a development plan should be made for the young scientists in the organization in terms of training for research proposal writing, research implementation and manuscript writing. They should also be assisted in the publication of papers in peer-reviewed journals.

2. Way forward

The search for funds will definitely be at top priority of the network as it marches into its third decade of existence. Strategies like expansion of target diseases, inclusion of more members and advocacy for multi-disease and more integrated interventions are expected to enhance its

competitive ability. Annual meetings might not be enough to discuss and develop strategies to address this critical problem. Constant communication and discussion using available communication technologies might be needed to track down funding sources and prepare requirements needed for funding proposals.

RNAS$^+$ will continue to contribute to the reduction of disease burdens due to schistosomiasis and other NTDs through training, research and information dissemination. Focus will be on (i) improving the research environment through standardization of technologies, procedures and protocols used in prevention and control;(ii) facilitating dissemination of reliable and up-to-date information about Asian helminth zoonotic infections including the production of risk maps for the target diseases; and (iii) developing a surveillance and response system for the diseases that are approaching the elimination goal.

More focus will be directed at training activities in specific fields such as immunodiagnostics, standardization of ultrasound use for monitoring infection-related morbidity, cost factor analysis, application of GIS/RS technology, environmental modification and human behaviour, agricultural efforts including livestock management for control of schistosome transmission for all the target diseases of RNAS$^+$.

Priorities will remain on documentation and development of health metrics that are not only useful in practice, but also support research on the impact of social determinants and economic issues on the epidemiology of Asian helminth zoonotic infections and NTDs. To promote these priorities, important activities include the promotion of GIS and remote-sensing techniques for the study of climate change and direct, epidemiological applications, development of new products, equipment and techniques to improve and standardize diagnostic capabilities, and implementation research related to control strategies. Vaccine development will be pursued and enhanced through the study of genetics and the immune responses against parasites to better understand the pathology caused (Charlier et al., 2018; Olveda et al., 2010; Poulin, 2002; Turner et al., 2015).

Available mechanisms for information-sharing will remain in place such as the network framework, the website, databases, publications and meetings. Future emphasis will focus on platform design and technical standardization aiming at fostering strengthened research capacity and the development of networking capacities and easy access to information.

The coming years may or may not be tough on the network and definitely RNAS$^+$ will rely heavily on the strengths that is has developed in the

past 20 years. These include its expertise such as in diagnostics, vaccine development, GIS and control strategies. It has a legal framework for networking and capacity to develop training packages such as for GIS, diagnosis, health metrics (e.g., burden assessment), molecular biology, vaccine and others. Its available mechanisms for sharing of information include a website, database, publications and regular meetings. It has a capacity to develop multidisciplinary approach, multicountry proposals for disease control. It has a direct linkage with different academic and research institutions competitive advantage as well as a strong linkage with control programmes of endemic member countries.

Challenges and opportunities will remain and will change in the forthcoming years and the survival of the network will depend on how well it will utilize its strengths as well as develop the next batch of leaders and members who will be at the frontline.

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