

Assessment of China's Contribution to the Regional Network for Asian Schistosomiasis: A Questionnaire survey

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Research

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Abstract

Background: The Regional Network for Asian Schistosomiasis and other Helminth Zoonoses (RNAS+) launched in 1998, has close partnerships with countries where schistosomiasis and other helminthiasis are endemic. RNAS+ has provided an ideal regional platform for experts involved in policy-making, control, and research of parasitic diseases in Asian countries. China, one of the initiating countries, has provided significant technical and financial support to the regional network. Although Chinese institutions provided great technical and resource support toward the RNAS+ development along with other member countries, its role and Chinese scientists or institutions' contributions have not been evaluated systematically. This study assessed the Chinese contributions in the support of RNAS+ development.

Methods: An assessment research framework was planned to evaluate China's contribution to RNAS+ based on four aspects, including capacity building, funding support, coordination, and cooperation. An anonymous web-based questionnaire was designed to acquire basic information of the respondents, China's contributions, challenges, and recommendations for RNAS+ development. Each participant scored from 0 to 10 to assess China's contribution: "0" no contribution, and "10" 100% contribution. Participants who included their e-mail address in the 2017 - 2019 RNAS+ annual workshops were invited to participate the assessment.

Results: Of 71 participants enrolled, 41 responded to the survey, 37 (37/41, 90.2%) of whom were from RNAS+ member countries while the remaining 4 (4/41, 9.8%) were international observers. Most respondents (34/41, 82.93%) are familiar with RNAS+. Respondents reported that China's contributions were mainly in improving of capacity building, providing funding support, responsible of the coordination, and joint application of the cooperation programmes in the development of RNAS+. The average scores of China's contributions in the above four fields were 8.92, 8.64, 8.75, and 8.67, respectively, with an overall assessment score of 8.81. The challenges of RNAS+ include the lack of sustainable funding and skills, and most participants indicated their continual need of China's support.

Conclusions This survey showed that China plays an important role in the development of RNAS+. This network-type organization for disease control and research can yet be regarded as a great potential pattern for China to enhance regional cooperation. These findings can be used to promote future cooperation between China and other RNAS+ member countries.

Background

Schistosomiasis, a serious infectious diseases caused by blood flukes, occurs in a total of 78 endemic countries worldwide [1]. Oriental schistosomiasis has been endemic in Asia with the first report in the early 1900s in China [2]. Until now, except in Japan where the disease has been eliminated, other Asian endemic countries are still at risk of transmission, including China, the Philippines, Indonesia, Lao PDR, Cambodia, Malaysia, and Myanmar [3-4]. To achieve the goal set by United Nations in the 2030 Agenda for Sustainable Development Goals (SDGs) of elimination schistosomiasis by 2030, a comprehensive,

multi-sectoral, and multifaceted approach across countries is needed to control, and eventually eliminate, the disease in Asia [5-6].

Efforts were made to initiate a collaboration between national research institutions and research groups within and outside Asian countries 20 years ago [7-8]. During a discussion session at an international workshop held in China in 1996, the Regional Network on Asian Schistosomiasis (RNAS) was organized, with plan to build a formal network during another international seminar in China in 1998. RNAS formally established during the first workshop of RNAS network in the Philippines in 2000 [3], aimed at uniting intersectoral, interregional, and international collaborations for multidisciplinary organizations (human medicine and veterinary medicine) and experts (researchers, scholars and policy-makers) in various fields from Asian disease endemic countries. The initiating areas of work included collaborative research, surveillance, and control of schistosomiasis in Asia, the network also advanced the technology for the control of *Schistosomiasis japonicum* infection [9-10]. In the fifth RNAS workshop in 2005, its focus was expanded from schistosomiasis to include other conditions, including cysticercosis, clonorchiasis, opisthorchiasis, paragonimiasis and fascioliasis, caused by helminthiasis treatable with praziquantel, thus giving rise to the Regional Network for Asian Schistosomiasis and Other Helminth Zoonoses (RNAS+) [3, 11-12].

The developmental pathway of RNAS+ was from a small start with only two countries (China and the Philippines) at the onset in 2000 [3,5]. Since then, its members have gradually increased to 11 countries (China, the Philippines, Cambodia, Indonesia, Laos, Thailand, South Korea, Japan, Vietnam, Myanmar, and Malaysia), in 2018 [3,5]. Statistically, over 90% of research institutions and disease control organizations working on schistosomiasis in Asia have participated in RNAS+ activities [13].

After a two-decade operation of RNAS+, its major achievements are reflected in the following four areas. First, the operational mode of RNAS+ was developed [12, 14]. The executive committee, with its responsibility of specifically managing the RNAS+, composed of a chairman, vice-chairmen, several executive members, and several international observers (assumed to be representatives of other member countries and international organizations), was formally formed. A rotating chairman system was adopted to elect the chairman. Second, the approach to RNAS+ information exchange and dissemination that was developed was to host annually academic exchange workshop and training courses [13]. Till date, 20 workshops (including the web-based 20th RNAS+ workshop held in Shanghai on October 22, 2020) were held in different member countries, which has led to improved national neglected tropical diseases (NTDs) control programs [3]. Third, some multi-country cooperative research projects were implemented through which scientists from different countries learned from one another to improve their relevant technologies for the application of serodiagnostics, ultrasound examination, mollusciciding, and surveillance response systems [15-16]. Fourth, capacity building was improved by more than a dozen training courses in the field of diagnosis, molecular biology, geographic information systems, and ethical issues that were arranged among member countries' younger generations [5, 17].

Although Chinese institutions provided great technical and resource support toward the RNAS+ development, along with other member countries, its role and Chinese scientists or institutions' contributions have not been evaluated systematically.

Some studies assessed the improvements and performances in capacity building [18], the health system [19], the quality improvement program [20], health technology [21], and so on. However, no published work exists on the assessment of the contribution of any member country in those regional networks in disease control. After a literature review, we found a qualitative study that assessed the improvement capacity of six UK healthcare organizations, using semi-structured interviews, policy documents, and assessment reports as their data sources [18]. A self-assessment questionnaire proposed by the World Health Organization (WHO) was used to assess the quality of the Estonian health system and comprised four domains (policy, organization, methods, and resources) [19]. The scoring criteria were developed to assess the quality of program theory [20]. A systematic review was used to evaluate the screening performance of maternal serum and ultrasound markers in detecting Down syndrome [21]. Limited methods exist for determining contributions of one country to their network. Researchers have recently offered a method to determine in-kind contributions in a donor-funded health capacity-building program in Africa, which estimates the monetary value of those contributions [22].

This study aimed to identify a method of assessment of China's contribution and role in the developmental pathway of RNAS+ through a case study approach along with a questionnaire survey and several quantitative indicators and scoring tables.

Methods

Assessment setting

In this study, we designed an assessment research framework to evaluate China's contribution according to the four major achievements of RNAS+ in the past 20 years. This framework covers the following four topics: (i) capacity building—providing opportunities for improving skills of scientists from RNAS+ member countries, (ii) funding support—sponsoring the activities of RNAS+, (iii) coordination—responsible for the operation and development of RNAS+, and (iv) cooperation programs—initiating the application of multi-country joint collaborative projects in Asia. For each topic, we designed several corresponding quantitative indicators. In addition, to obtain the direct value of China's contribution using this network, we created a score sheet on the above topics as well as for the overall contribution with scores ranging from "0" to "10." The higher the score, the greater the contributions.

Questionnaire and data collection

We designed an anonymous, web-based questionnaire on the above assessment research framework as an assessment tool for evaluating China's contribution to RNAS+. A questionnaire survey was used to collect the assessment information, and participants who frequently attended the recent RNAS+ annual workshops were invited to participate in this survey. Participants were required to complete the

questionnaire just once even if they attended more than one meeting. Each participant indicated a value for his/her understanding of RNAS+; the higher the value, the more familiar they were with RNAS+.

Three senior professionals of RNAS+ provided input to the content of the questionnaire and revised it, before the formal survey. This questionnaire had three parts: (i) general information of the participants; (ii) the core of the evaluation, China's contribution to RNAS+ (Table 1), contained quantitative indicators and scoring tables on capacity building, funding support, coordination, cooperation programmes, and overall assessment, from the evaluation framework; and (iii) challenges and suggestions for RNAS+ development. The survey was developed on WENJUANXING (China, online link address: <https://ghcnipd.wjx.cn/jq/38580819.aspx>).

We distributed this web-based survey by e-mail to the participants who provided their e-mail address during the three recent RNAS+ annual workshops from 2017 to 2019. In order to encourage the participants to complete the questionnaire, two reminders were sent to each participant who were also asked to send the link to their colleagues or friends who attended the RNAS+ annual workshops.

Data analysis

All original data of this web-based questionnaire were downloaded as a .sav file format from the backstage management platform. Because all the questions in the web-based questionnaire were required, all the data were compliant with the integrity verification requirements. Data analysis was performed using IBM SPSS statistic for Windows, version 26.0 (IBM Corp., Armonk, NY., US). Frequency and related percentage were reported to describe classified variables. The arithmetic average was reported for continuous variables, as well as a bar chart to present the numerical distributions. Highcharts were used to analyze the open-ended questions.

Ethical review

This study was approved by the Ethical Review Committee of the National Institute of Parasitic Diseases (NIPD), Chinese Center for Disease Control and Prevention (China CDC) (Approval No.2019006). This survey was anonymous and voluntary, and the submission of the responses to the questions online implied willingness to participate in this survey.

Results

General information

Of 71 participants who participated in the 2017, 2018, and 2019 RNAS+ annual meetings and provided e-mail address addresses, 41 responded to the survey. The general information of the respondents presented in Table 2. Twenty-seven participants were male, 85.4% (35/41) were aged > 35 years, most (n=37, 90.2%) were from the RNAS+ member countries, while the remaining 4 (9.8%) were the international observers at RNAS+. Most respondents were from Indonesia (n=8, 19.5%), followed by China(n=7, 17.1%).

As shown in Figure 1, most of respondents were familiar with RNAS+ (38/41, 92.68%), their understanding of RNAS+ was more than 60%, and only 3(3/41, 7.32%) respondents had less than 40%. Importantly, 31.7% (13/41) indicated that they had 100% understanding of RNAS+, and the average value of understanding of RNAS+ was 83.2%.

The overall assessment of China's contribution to RNAS+

According to the survey, every participant gave a score to indicate China's contribution to RNAS+ (Table 3). The average score for the overall assessment of China's contribution to RNAS+ was 8.81 (10 maximum score). The average score of China's contribution to the improvement of capacity building, funding support, coordination, and the application of cooperation projects in RNAS+ were 8.92, 8.64, 8.75, and 8.67, respectively.

China's contribution in improving capacity building of RNAS+

According to the survey, four RNAS+ annual training courses were held in China. In addition, 7/41 (17.07%) respondents had attended the short-time training in China, including on snail control and schistosomiasis diagnosis skills. A total of 38/41 (92.68%) participants indicated that they had learned useful skills from training activities held in China, and the top three were control strategy, diagnosis, and geographic information system (GIS)(Figure 2).

China's funding contribution to RNAS+

Most respondents, 73.17% (31/41) had received China's grants to attend RNAS+ annual workshop, and 26.83% (11/41) of them received more than 5 times. In addition, China also sponsored the annual workshop not held in China. Most respondents, 70.73% (29/41), attended the RNAS+ annual workshop mainly sponsored by China but not held in China for more than once. Among respondents, 34.15% (12/41) said that China provided grants to support the annual workshop not held in China at least 5 times.

China's contribution to the coordination of RNAS+

NIPD was one of the two institutions participating in the RNAS+ initiative. Chinese experts played important roles in the initiation and scale of the network. To date, two out of 5 experts had served as chairmen of RNAS+, 52.66% (22/41) of the respondents had invited/coordinated with China as instructors in the RNAS+ training courses or as the speaker at the annual workshops. China established the RNAS+ website (<http://www.rnas.org.cn/>) and is responsible for website maintenance and information updates, while 68.29% (28/41) of the respondents know the address of the China-led RNAS+ website.

China's contribution to the application of cooperation programme / project jointly run with RNAS+ member institutions

NIPD, along with national research institutes of the Philippines, Laos, Cambodia and other countries, jointly applied and received two rounds of funds from the International Development Research Center (IDRC), 36.59% (15/41) of the respondents attended this IDRC project. Most respondents, 82.93% (34/41) are willing to apply the new “Belt & Road Initiative”-related program with Chinese experts in the future.

Challenges and suggestions for RNAS+ development

From the survey, the challenges faced by RNAS+ (Figure 3) and bits of advice on what China should do in future (Figure 4) are summarized as follows. First, the most important challenge of RNAS+ was the lack of the sustainable financial support, and more than half of the participants (26/41) mentioned the word “funding” in the open-ended question. Second, some participants pointed out that there were some challenges with the research and diagnosis skills that need to be addressed on NTDs in the region. Other areas, such as the emerging and re-emerging disease control as well as the multi-country collaborations among scientists and control authorities also need to be supported. Third, how to enhance the impact of this network and improve interregional conflicts are important issues that should be addressed.

Regarding China's future contribution to RNAS+ development, most the participants indicated that it is essential for China to continue her support in the following five areas: funding, research and technology, capacity building, and RNAS+ annual workshops as well as in training activities. In the future, the participants proposed that China should continually share in the working experience and resources, jointly apply bilateral/multilateral partnership projects with member countries, and release more members and international agencies to RNAS+, to strengthen the operation of the network.

Discussion

RNAS+ celebrated its 20th anniversary in 2018 in Shanghai, China [3]. Since 2000, a total of 20 annual workshops have been organized in China, Philippines, Cambodia, Laos, Indonesia, South Korea, Vietnam, Thailand, and Myanmar. The number of professionals and medical and health administrative staff that have participated in RNAS+ annual workshops or training courses are a total of 1,099 person-time from 2000 to 2016 [13]. Now, RNAS+ has 11 member countries and occupy the main part of the economic circle in Northeast Asia and the Association of Southeast Asian Nations, with a population of about 2 billion.

China, as the founding country, has been actively engaged in the development of RNAS+. This paper offers a direct method to assess China's contribution to the development of RNAS+. In this survey, through the scoring method, most participants gave a high score on China's contribution to the development of RNAS+. This means that those participants agreed that China made great contributions and played an important role in RNAS+. Combined with this survey and the literature review, we concluded that China has contributed to the RNAS+ development in several ways by: (i) promoting fundraising, capacity building, and coordinating the affairs at the annual workshops and training courses organized by RNAS+ [5, 23]; (ii) sharing important experiences on China's achievements on schistosomiasis and other parasitic diseases control [24-25]; (iii) actively promoting the routines running

of RNAS+ activities, including agenda setting and workshop reports [26]; (iv) directly participating in the training courses on instructions for schistosomiasis diagnosis, spatial informatics and others [5, 13]; (v) establishing and updating the RNAS+ website [27]; and (vi) playing the leading role in project cooperative studies, such as IDRC projects [28-29], ultrasound diagnosis of *S. japonicum* infection [30], and epidemiological study on control strategy of schistosomiasis and liver fluke infection [31-32], etc.

A special issue was published to introduce the origin, progress, outcomes, challenges, and the way forward for the RNAS+ in the past 20 years [3, 5, 14-17, 33-34]. RNAS+ is setting up a platform for sharing information to enhance multi-country, multi-disease, and multidisciplinary collaboration in the Asian region. As a result of the highly collaborative projects among member countries, RNAS+ promotes the understanding of various aspects of schistosomiasis and other diseases, and emphasizes that an integrated control approach can be established to eliminate the disease through intersectoral collaboration. On this issue, China's contribution is also affirmed on the four parts, such as capacity building [14], funding support [14], coordination [3, 16], and cooperation program [5, 15-17], of the development of RNAS+.

Additional challenges identified in the survey for the RNAS+ were majorly reflected on sustained funding, as well as research grants, which is also indicated in the latest RNAS+ issue of publications [34]. RNAS+ has no sustainable funding by itself as well as no fixed support from any large-scale transnational cooperation program. This indicate a huge lack of financial support, and most respondents mentioned that there is need to increase financial support. Moreover, RNAS+ inspired research and cooperation projects are limited, and continuous skills and programs are needed to combat NTDs and emerging parasitic diseases in this region. Additionally, how to improve the impact of the network and how to deepen the cooperation is also a challenge. Undoubtedly, more donors are needed to assist the network in its current and future activities [33].

Several ways to enhance China's contribution to RNAS+ development in the future were suggested. First, China has made great progress in schistosomiasis control in the past 70 years [35-36], China should continually take sharing its experiences and enhancing the cooperation within member countries as the significant issue [37-38]. Second, due to capacity building needed by RNAS+ members, China can continue to support annual workshops and technical training as well as collaboration research [39-40]. Third, China can motivate more institutions and international organizations to join and enlarge the institutional coverage of RNAS+. In addition, the practice of RNAS+ suggests that establishing a network-type organization is a good approach, therefore, in addition to schistosomiasis and NTDs, other diseases requiring particular control with joint efforts in one specific region can also refer to this mode of networking for regional cooperation [41].

To our knowledge, this is the first attempt to assess China's contribution in the regional networks, using an assessment questionnaire with the quantitative indicators with four parts and scoring method. This is only one possible attempt to assess the contribution in the network. However, there are some limitations to this survey. Most of all, the number of participants is limited, and no responses were received from

Japan and South Korea, which are two member countries of RNAS+, thus, the results may not represent those of all experts from all member countries. Moreover, this assessment was not carried out by an independent third party, which may have affected the results' explanation to some extent. However, this survey has valuable reference on the role of China in the development of regional cooperation networking.

Conclusion

This survey showed that China plays an important role in the development of RNAS+ networking in the fields of capacity building, funding support, coordination, and cooperation programs. China has effectively shared experiences and provided professional support on technologies and resources for member countries during the past 20 years. The challenges of RNAS+ included lack of sustainable funding, research, skills, and impacts. China's support is continually needed, especially in organizing annual workshops, capacity building, and cooperative research. The network-type organization, of RNAS+, which focuses on the cooperation for disease control and research, can yet be regarded as a great potential pattern for China to enhance regional cooperation. Thus, the research findings can be used to promote future cooperation between China and other RNAS+ member countries

List Of Abbreviations

RNAS+: Regional Network for Asian Schistosomiasis and other Helminth Zoonoses; RNAS: Regional Network on Asian Schistosomiasis; SDGs: Sustainable Development Goals; NTDs: Neglected Tropical Diseases; ASEAN: Association of Southeast Asian Nations; NIPD: National Institute of Parasitic Diseases; China CDC: Chinese Center for Disease Control and Prevention; IDRC: International Development Research Center; WHO, World Health Organization.

Declarations

Ethics approval and consent to participate

This study was approved by the Ethical Review Committee of the National Institute of Parasitic Diseases (NIPD), Chinese Center for Disease Control and Prevention (China CDC) (Approval No.2019006). This survey was anonymous and voluntary, and the submission of the responses to the questions online implied willingness to participate in this survey.

Consent for Publication

Not applicable.

Availability of data and material

Please contact author for data requests.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

HML, YJQ and KY drafted and modified the questionnaire. HML and XNZ completed the manuscript. WD, LLH, XJM and LD helped the survey and collected the data. DQW, YYG, NX and XNZ supplied the technology support and coordination for the whole project.

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Tables

Table 1. Assessment framework of interview questions

Assessment framework	Assessment questions
Topic 1: Capacity building	<p>1. The number of RNAS+ training courses held in China?</p> <p>2. Have you ever attended the short-term training organized by China (except for the RNAS+ annual meeting/training)?</p> <p>3. Which skills did you learn from China (by workshops and trainings)?</p>
Topic 2: funding	<p>4. How many times have you received China's grant to attend RNAS+ annual meeting/training?</p> <p>5. How many RNAS+ annual meetings / trainings were mainly sponsored by China but not held in China:</p>
Topic 3: coordination	<p>6. Currently, there are already five committee chairmen of RNAS+. Do you know how many of them are Chinese?</p> <p>7. Have you ever been invited by China to be the instructor of RNAS+ training / the speaker of the annual meeting?</p> <p>8. Do you know the address of the RNAS+ website?</p>
Topic 4: cooperation program	<p>9. Did you participate in the IDRC project?</p> <p>10. Are you willing to apply the new "Belt & Road Initiative" related program with Chinese experts?</p>
Scoring sheet	<p>Please indicate a score of 0 to 10 for China's contribution / role in RNAS+ (Description: "0" is no contribution, "10" is 100% contribution):</p> <p>11. China's contribution / role in improving capacity building of RNAS+?</p> <p>12. China's funding contribution / role to RNAS+?</p> <p>13. China's contribution / role in the coordination of RNAS+?</p> <p>14. China's contribution / role in applying for cooperation program / project jointly with RNAS+ member institutions?</p> <p>15. The overall assessment of China's contribution / role in RNAS+?</p>

RNAS+, Regional Network for Asian Schistosomiasis and other Helminth Zoonoses; IDRC, International Development Research Centre

Table 2: Characteristics of the survey respondents

Variable	Description	Frequency	Percent ^a	100% ^b
Gender	Male	27	65.85	
	Female	14	34.15	
	Total	41	100.00	
Age (years)	≤35	6	14.60	
	>35	35	85.40	
	Total	41	100.00	
Education level	Diploma and below	2	4.88	
	undergraduate	0	0.00	
	Postgraduate	17	41.46	
	Doctor	22	53.66	
	Total	41	100.00	
Nationality	Cambodia	5	12.20	
	Indonesia	8	19.51	
	Laos	1	2.44	
	Philippines	4	9.76	
	Thailand	7	17.07	
	Vietnam	3	7.32	
	Myanmar	2	4.88	
	China	7	17.07	
	Others:2 Australia;1 Sweden; 1 USA	4	9.76	
	Total	41	100.00	
Current employer	Government Authority	8	19.51	
	University/ Research Institute	29	70.73	
	Company / Enterprise	2	4.88	
	Others: Retirement	2	4.88	
	Total	41	100.00	
Current focus area	Health management	1	2.44	
	Diseases prevention and control	20	48.78	
	Research and development technology	18	43.90	
	Health policy	2	4.88	

Table 3. Assessment score of China's contributions to RNAS+ by survey respondents

Variable	Score*										Average score**
	0	1	2	3	4	5	6	7	8	9	
China's contribution in the improving of capacity building of RNAS+? N(%)#	0(0%)0(0%)0(0%)0(0%)0(0%)	0(0%)	0(0%)	0(0%)	4(11.11%)	8(22.22%)	11(30.56%)	13(36.11%)			8.92
China's funding contribution to RNAS+? N(%)#	0(0%)0(0%)0(0%)0(0%)1(2.78%)	0(0%)	2(5.56%)	4(11.11%)	7(19.44%)	9(25%)	13(36.11%)				8.64
China's contribution in coordination of RNAS+? N(%)#	0(0%)0(0%)0(0%)0(0%)0(0%)	1(2.78%)	2(5.56%)	3(8.33%)	6(16.67%)	11(30.56%)	13(36.11%)				8.75
China's contribution in applying for cooperation programme / project jointly with RNAS+ member institutions? N(%)#	0(0%)0(0%)0(0%)0(0%)0(0%)	2(5.56%)	1(2.78%)	3(8.33%)	7(19.44%)	11(30.56%)	12(33.33%)				8.67
The overall assessment of China's contribution in RNAS+? N(%)#	0(0%)0(0%)0(0%)0(0%)0(0%)	0(0%)	0(0%)	2(5.56%)	2(5.56%)	8(22.22%)	13(36.11%)	11(30.56%)			8.81

* The scores indicated by the respondents about China's contribution to RNAS+ from the questionnaire, "0 score" meant no contribution, "10 score" indicated 100% contribution, the higher the score, the more important of China's contribution in RNAS+.

** average score: the sum of all scores marked by respondents / the number of total respondents.

N(%): the number of respondents in each score (the number of respondents in each score/total of respondents×100%).

Figures

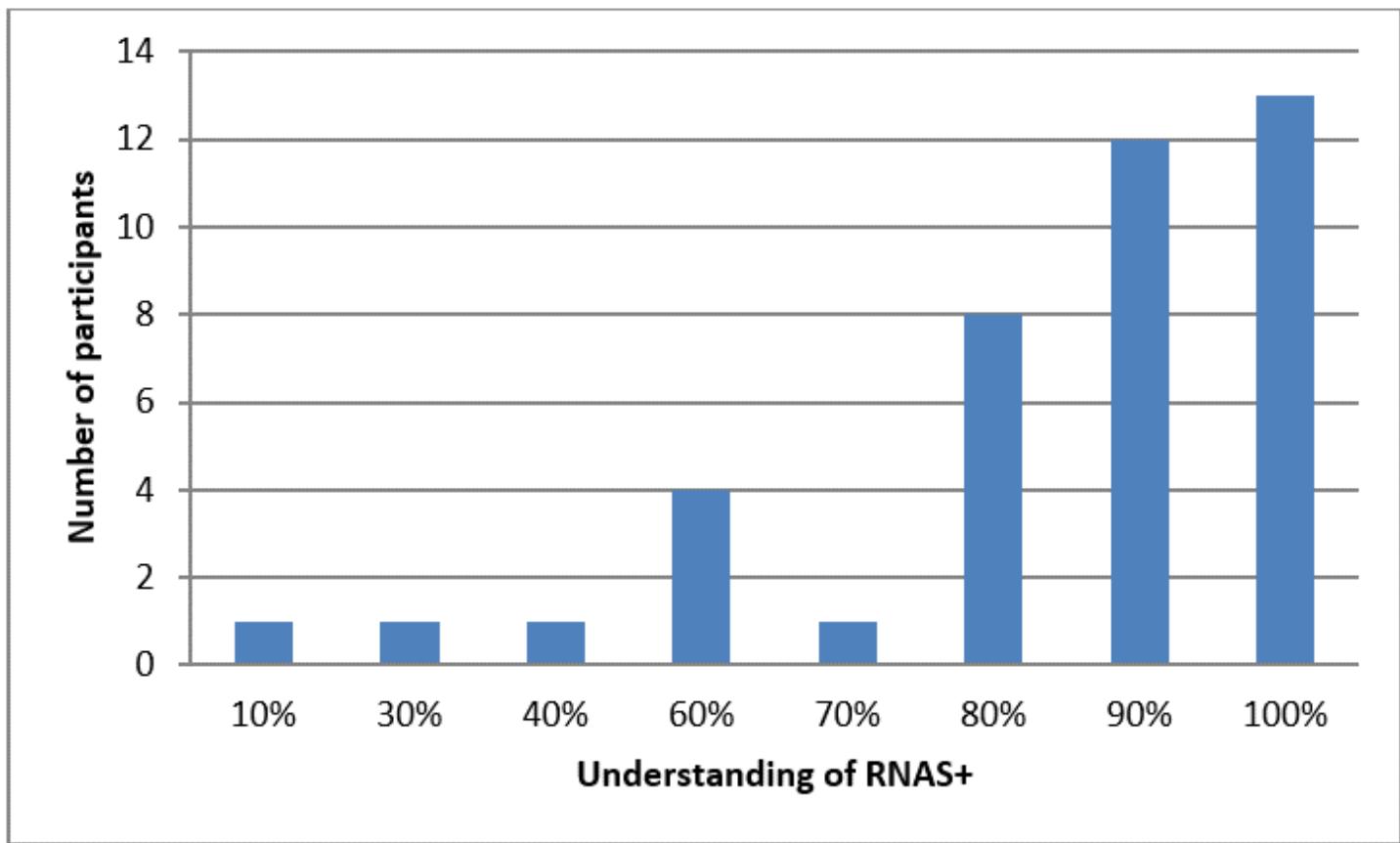


Figure 1

The participants understanding of RNAS+ (the understanding values ranged from 0 to 100%, "0" represented unknown of RNAS+, "100%" represent complete understanding of RNAS+. The higher the value, the better of the understanding of RNAS+)

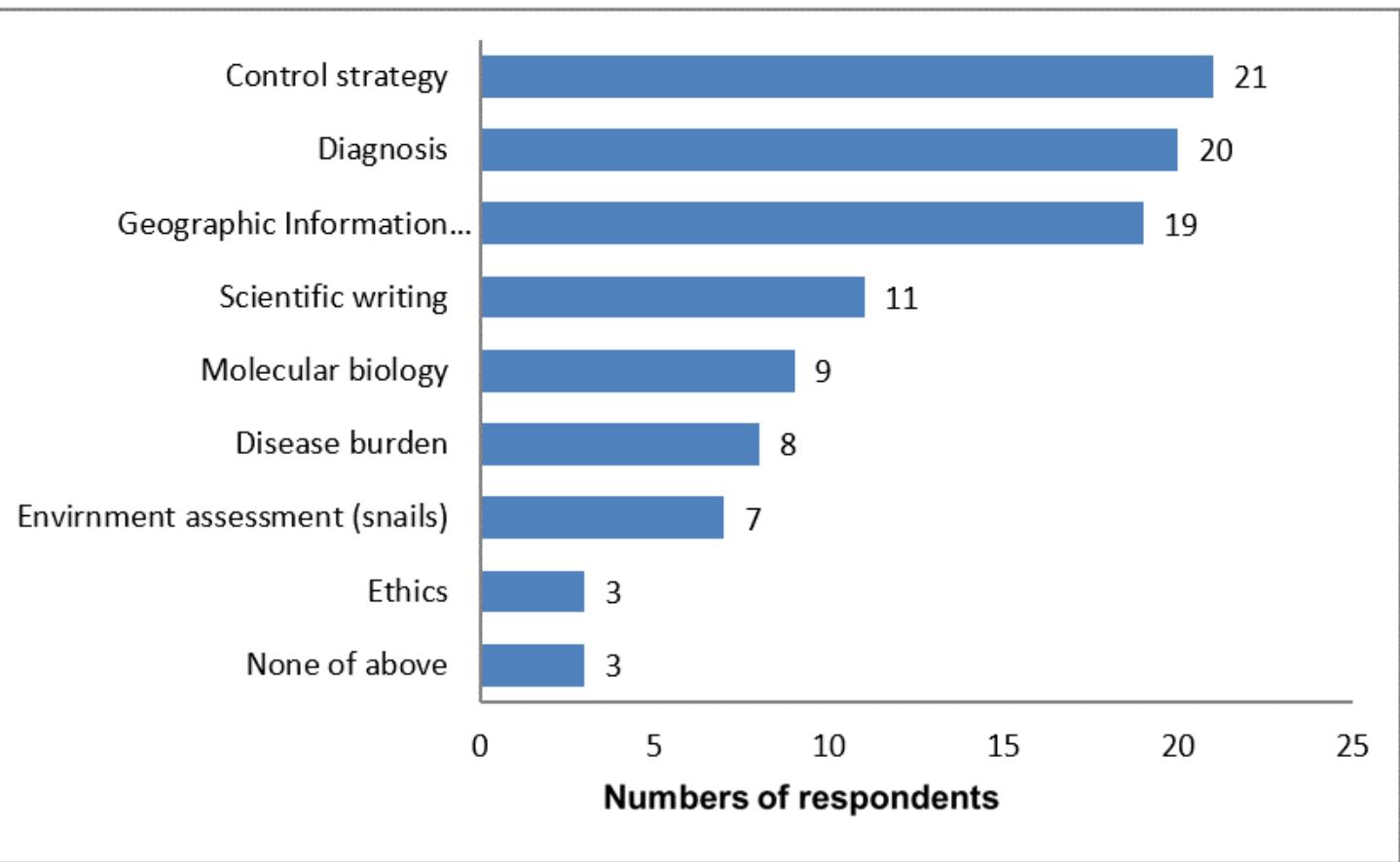


Figure 2

Skills learned from training activities held in China by survey respondents



Figure 3

The fastcharts of challenges confronting RNAS+ according to the survey participants

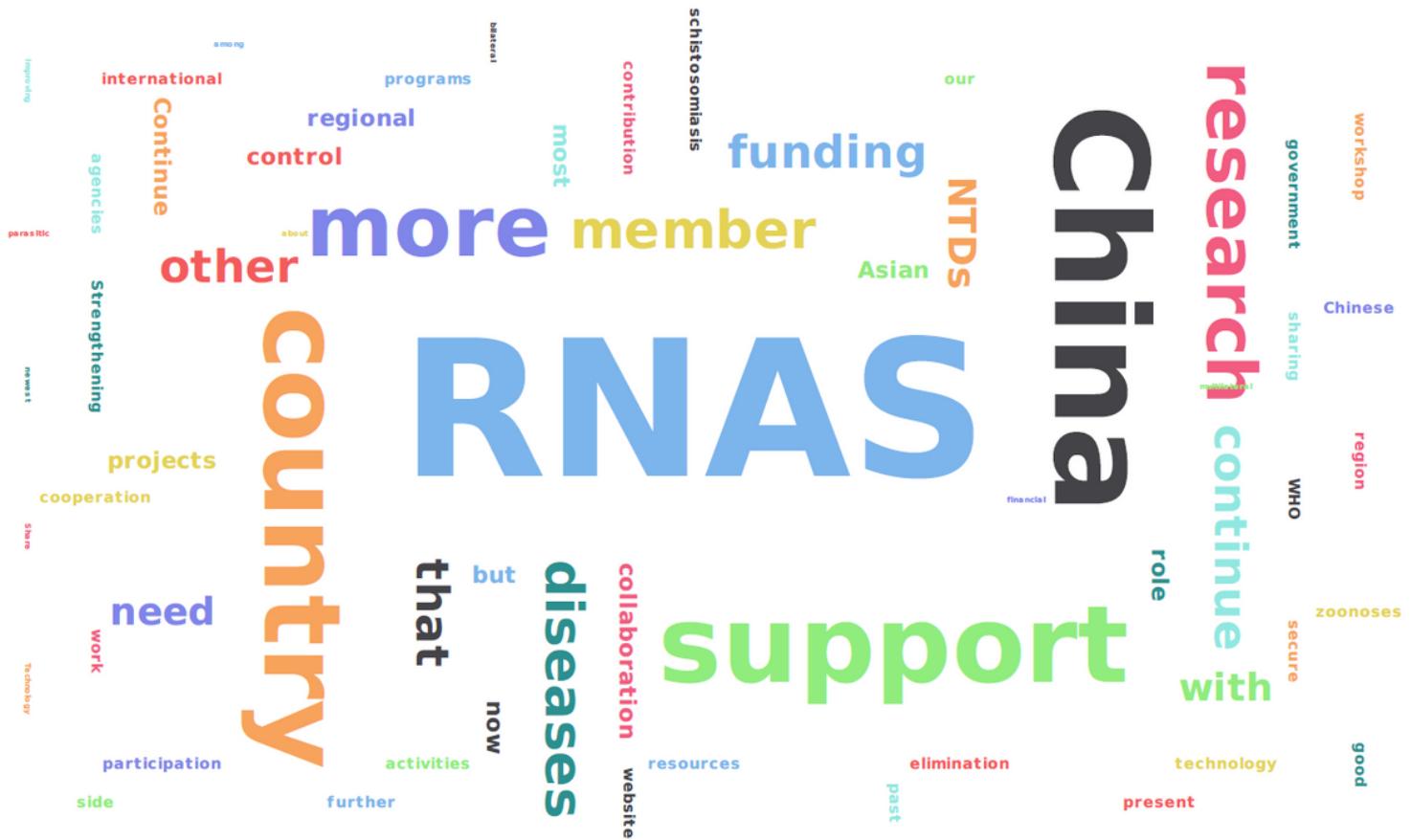


Figure 4

The fastcharts of bits of advice regarding China's future role in RNAS+ development according to the survey participants