Editorial

Science in One Health: A new journal with a new approach

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ABSTRACT

One Health recognizes the close links and interdependence among human health, animal health and environmental health. With the pandemic of COVID-19 and the risk of many emerging or reemerging infectious diseases of zoonotic nature as well as the spreading antimicrobial resistance, One Health has become one of top concerns globally, as it entails the essential global public health challenges from antimicrobial resistance over zoonoses, to climate change, food security and societal well-being. Research priorities in One Health include the study on interactions of human-animal-plants-nature ecology interface, systems thinking, integrated surveillance and response systems, and the overall One Health governance as part of the global health and sustainability governance. The now launched journal, Science in One Health, aims to be a resource platform that disseminates scientific evidence, knowledge, and tools on the One Health approaches and respective possible socio-ecological interventions. Thus, aims at providing fruitful exchanges of information and experience among researchers, and decision makers as well as public health actors.

1. Background

With the acceleration of globalization and development combined with enormously increasing population growth and dynamics, a fast-moving process sprang up in human ecological civilization. In the life science fields, revolutions continually pushed the development of researches in medicine and public health. During the modern human history, a few essential life science revolutions occurred, namely molecular biology leading to genomics, and all other ‘omics’ disciplines as well as major advances in imaging technologies allowing even molecular analyses in living organisms. All the revolutions represented qualitative leaps in life science and strongly supported researches and possible new tools and interventions in global public health [1–3]. Nevertheless, environmental disruptions with massive ecosystem changes undeniably followed human development. Damages including climate change, desertification, loss of biodiversity through species extinction that will all impact several generations of human beings. This led to the thinking on sustainability and setting of sustainable development goals [4] which included introspection that not only human health, but also animal health, plant health, and ecological environment health are of great consideration as well and govern the well-being of our planet [5].

When look back at the history of One Health development, we found comparative medicine was raised to combine philanthropy and veterinary medicine in the 19th century. In the 20th century, a series of concepts were put forward from One Medicine to Ecosystem Health (EcoHealth) [5]. The development of One Medicine to One Health concept has not been broadly adopted until the concept of One Health underwent careful, practical and seminal validation programmes in Chad and Maurenitia from 1998 onwards [7,8]. One Health was further reinforced from 2003 onwards when pandemics of severe cute respiratory syndrome (SARS) and H5N1 bird flu occurred. Therefore, the concept of One Health was proposed by international agencies and non-governmental organizations (NGO). Initially, One Health emphasized the joint discussion of human, poultry and wildlife health [9]. The aim of One Health was to improve human and animal health through cooperation of multi-departments relevant to health, or to save money and add value in environmental services [10].

The rapid development of One Health has been intrinsically linked to international organizations and NGO which, in the last two decades, applied One Health approach in their guidelines and practices. One Health courses also took place within the educational system, e.g., universities and colleges. In 2004, the Manhattan Twelve Principle was announced by the Wildlife Conservation Society to appeal for eco-health and to build a bridge for health inter-discipline communication under the umbrella of globalization [11].

The American Veterinary Medical Association (AVMA) set an action group for One Health initiative firstly in 2007, which evolved into the One Health Commission (OHC). The first One Health action plan was signed in 2010 by the Food and Agriculture Organization of the United Nations (FAO), the World Organization for Animal Health (OIE), and the World Health Organization (WHO) [6]. The FAO-OIE-WHO tripartite appealed for shared responsibility and coordinating activities on the human-animal-ecosystem interface. Afterwards, scientific research institutions in One Health were established in countries including United States, Australia, and Canada, etc. [12]. In China, the first One Health international forum was hold in Guangzhou in 2014. In 2020, the Chinese academician Guo-Qiang Chen from Shanghai Jiao Tong University School of Medicine raised “Quan Jian Kang (全健康)” as Chinese
translation of One Health [13], which implied Chinese traditional theory that human is an integral part of the nature (‘天人合一’) as proposed by Zhuang Zi, a Taoist philosopher, over 2300 years ago [10].

The Chinese President Xi Jin-Ping raised the theory of a Global Community of Health for All, which paved the way for One Health practices [14]. Based on current knowledge gaps on the One Health approach, One Health practices need to be promoted in the following, but not limited to, four actions, (i) establishing the concept of One Health in multi-sectors of governments and organizations, and applying the One Health approach to develop a holistic goal of health by initiation of One Health coordination mechanism; (ii) setting up One Health demonstration projects in appropriate areas to achieve implementation with impact on health and well-being at local settings with regional cooperation; (iii) strengthen research capacity on One Health to promote more international cooperation in a transdisciplinary way; (iv) exploring opportunities for One Health diploma implementation in universities in order to train more talents able to disseminate the One Health approach to local communities.

2. Rational for launching the new journal: Science in One Health

As one of the avenues to create a scientific resource platform to disseminate knowledge, evidence as well as potential solutions through tailored socio-ecological interventions on One Health, we are launching this new journal entitled Science in One Health, with unique reasons as follows:

2.1. Holistic health becomes one of top global concerns

With the pandemic of the novel zoonotic coronavirus disease (COVID-19), the potential risk of many more zoonotic infections and the growing antimicrobial resistance (AMR), the overall health of human, animal, plant and ecosystem has tightly attracted global concerns and, the importance of One Health has further increased. In May 2021, the WHO, FAO, OIE and United Nations Environment Programme (UNEP) established One Health High Level Expert Panel (OHHLEP) to formulate long-term global actions for preventing disease outbreaks [15]. In December 2021, OHHLEP formally proposed the definition of One Health [16], which emphasized the deepening of health connotation, clarifying that the health of human, poultries, wild animals, plants and ecosystems were closely linked and interdependent. OHHLEP also appealed that all sectors and disciplines work together to promote well-being, cope with public health threats, and promote sustainable development.

One Health as a critical global concern, was clearly also recognized by the G7 in June 2021, followed by the G20 at the Riyadh summit in November 2021, where the One Health approach was declared as an essential way forward. The G20 declaration not only called for acceleration of research and development of new antimicrobial drugs, but also for sustainable control programs of both infectious and non-communicable diseases [17].

2.2. One Health has been promoted by emerging issues

Human-animal-ecosystem interface is linked to many emerging issues worldwide, in the following ways:

(i) It has been noticed that human-animal-ecosystem interface does broadly affect essential areas like food security, AMR, and impact of climate change on health and thus sustainability of our planet,
(ii) The interactions between human health and animal health are closely linked to zoonoses epidemic, food-borne diseases transmission, and emerging and re-emerging infectious disease outbreaks;
(iii) The connections between human health and ecosystem health are also associated with difficulties in ecological restoration, disease transmission ecology, and migrations of pathogens.

(iv) The intersections between animal health and ecosystem health are linked with several consequences in biodiversity conservation, environmental changes, species migration and animal diseases.

Up to date, it has been well recognized that the most important global health issues needed to be addressed by the One Health approach. The areas of highest priority and urgency are the emerging issues of zoonotic risks, AMR, the effects of climate changes on health and food security. Therefore, this implies promoting the One Health approach as integral part of good governance mechanisms emphasizing also sustainable support by local governments.

2.3. One Health approach has been implemented in many settings

Thus far, One Health approach has been implemented in various scenarios in many countries and, results of implementations have been noted to put into the resolutions of varying international agencies, NGOs, as well as into those of the G20 and G7. Firstly, control of zoonotic diseases with a cost-effectiveness strategy has been applied in many resource-limited countries [19]. More than 200 zoonoses so far known are being caused by pathogens such as bacteria, fungi, viruses, and parasites, which seriously threaten human health and agriculture development [20]. With the destructive usage of natural resources, humans had more chances to contact with wild animals that carry various pathogens, just like opening the Pandora’s Box [21]. Secondly, AMR, closely linked to our current food production, involve many elements like domestic animals, wild animals, pets, fish, plants, people, soil and water. For example, illegal addition of precious reserved, tertiary antibiotics from human drugs and/or veterinary drugs in poultry can cause pressure for drug resistance developments at all levels for which is already emerging evidence from population-based studies. Without One Health concerns in animal health, such evidence would be overlooked [18]. Thirdly, the impacts of global warming and environmental changes were not limited to ecosystem, but also humans, animals, and plants. The WHO announced that the impact of global climate change on human health is manifested in the aggravation of global disease airborne transmission and premature death, which has been considered as a main public health threat [22]. Besides the extreme climatic phenomena, climate changes are affecting human health by increasing infectious diseases and mental illness during migration, by causing malnutrition through impact of food reduction [21]. Fourthly, food security is an interdisciplinary field of ensuring food hygiene and food safety in the process of food processing, storage, and sales, therefore reducing hidden dangers of disease, and preventing food poisoning [23]. It involves many links such as planting, breeding, processing, packaging, storage, transportation, sales, consumption, which not only involve fields of botany, environmental science, microbiology, but also those of economics, society, and management [20]. Finally, governance component is of importance in promoting and managing One Health projects, which can be used in several contexts such as corporate governance, international governance, national governance, and local governance to improve the cost-effectiveness of One Health activities, especially in initiation stage of a One Health program. Thus, it is necessary to operate any One Health approach by good governance with local government and the private sectors to elaborate civil engagement with more members of the community for the best options that serve the people. It has been argued that eight major components are involved in good governance, that is: participatory, consensus-oriented, accountable, transparent, responsive, effective and efficient, equitable and inclusive, and follows the legislative basis of a given setting. Those eight governance elements have been used in the assessment of performance in One Health governance [24,25].

3. Research priorities in the One Health approach

In spite of One Health concept has been proposed for more than dozen years, many gaps still exist. More researches have to be undertaken on
needs/demands-based approaches to address the current global urgencies. This includes understanding the pathway of interactions among human, animal, plants and the respective ecosystem in any specific setting. Only the global concerns applied and tailored to local settings with allow exploring more cost-efficiency models to implement the One Health actions/interventions. It is at this stage that conceptual analysis must be complemented and even replaced by the approaches of the theory of change and the development of improved the surveillance and response systems allowing effective forecasting, early warning and targeted action. It is in this way also efficient coordinating mechanism of One Health governance for One Health actions and overall societal well-being can be sustainably established.

3.1. Interaction research on human-animal-plants-nature ecology interface

Any One Health project involves the “human-animal-environment” interface, which covers a wide range of aspects, including human, animal, plants and the ecosystem. All these aspects are necessary to take actions for the same objectives in a unified step to obtain the optimal outcomes. To achieve this goal and get the optimal outcomes eventually, it is necessary for us to understand the interactions and effectiveness in a systemic approach. Therefore, it is recommended that research priorities investigate on understanding on the determinants and drivers of the One Health systems including cost-effectiveness and cost-benefit dimensions in a systemic way. This entails science ranging from basic science to large implementation programs, from their validations and relevant implementation science to modelling of these case studies with sensitivity analyses. Thus, the One Health approach can become a powerful avenue to mobilize resources with an optimal cost-effectiveness and cost-benefit balance.

3.2. Systems thinking to promote implementation of the One Health approach

Systems thinking is used for understanding how multi-systems at different levels influence one another as a whole issue. Systems thinking, recently, has been defined as an approach to get solution by consideration of “problems”, interactions and dynamics as parts of an overall system, rather than taking view of specific part/component. Hence, this approach is fit well to the One Health concept which advocates interdisciplinary, interdepartmental and transnational cooperation at the local, regional and global levels to explore the complex relationship among human, animal and the environment. In other words, the systems thinking approach is the only approach that can guide scientists in One Health to get optimal solutions for complex health problems.

In the nature, elements such as air, water, environment, plants, and animals are co-living in a system as a whole, while this big system consists of various small ecosystems which need to be approached by systems thinking to gain the cost-effective solution against complex public health issues by multi-sectors. Therefore, it is strongly recommended to not limit researches to the fields of biology, medicine or veterinary medicine only, but expand the ‘traditional’ researches to economics, social sciences and management. Clearly and as an example from the control of COVID-19 pandemic, what could be the best mechanism that can be efficiently operated at global level covering all global organizations such as WHO, FAO, OIE, and NGOs, as well as at country-level departments proactively involved in control activities and logistic support to the public health social measures against COVID-19 pandemic to ensure effectiveness at the local, national and global levels?

3.3. Integrated surveillance and response systems

It is well known that adequacy and timeliness are of capital importance to tackle the complex health problems, especially emerging zoonotic diseases and environment related health issues. Therefore, enabling a timely as well as public health responses tailored to a respective setting, it is necessary to achieve continuous forecast and surveillance and response systems based on the minimal essential information in space and time. The implementation of the One Health approach requires effective surveillance-response as a prerequisite. In practice, a guideline for surveillance and response to the emerging or endemic diseases is essential to unify all protocols for surveillance and response system building. However, there is a phenomenon that policies or guidelines formulated at national level are difficult to be carried out at local level, resulting in low efficiency. Hence, establishment of an effective national guideline to support the surveillance and response system by integrating various resources at country level or local level, is a typical scope of the One Health approach. For example, local governments in China have implemented the “1-3-7” surveillance and response norm in all malaria endemic counties, which helped the Chinese national malaria elimination program accelerate achievement of the goal of malaria-free in 2021, with zero indigenous cases for successive 3 years after 7 decades’ efforts. In addition, the Chinese surveillance and response system is also being used effectively for post malaria elimination program in the country to prevent re-introduction of malaria transmission from imported cases [26].

3.4. One Health governance

One Health governance aims to establish a governance system with a high agenda on the One Health approach that integrate policies, laws, and regulations among government departments. One Health governance opens up the cooperation path of various intergovernmental departments, and strengthens cooperation of different fields and international organizations, supported by certain policies or even a specific law. Science on One Health governance will cover and inspire health strategy and policy, global health security. This type of implementation science is crucial as it allows, each actor to participate from its angle and - within a systems approach - analyzes of its own interests, discovers problems, determines governance priorities, implements targets, formulates and implements policies, and monitors the outcomes [27]. Therefore, implementation science must go alongside with the action plans and projects related to the One Health governance, so that the results of the research could directly contribute to the application of One Health theory to solving the public health problems through better coordinating. For example, in China, by using the research findings of implementational science amid COVID-19 pandemic, the countermeasures of early case finding and subsequent early quarantine, vaccination development and application, and public health social measures, have been quickly implemented in the control programs to prevent COVID-19 from spreading [28]. Another example is that once ecological measures added into schistosomiasis control program in Eryuan County of China, the disease elimination goal was achieved with acceleration. This illustrated a dynamic modeling system through strong government leadership in coordinating all relevant departments, and mobilizing and integrating resources to improve the efficiency of the program [29].

4. The scope of the journal

In May 2020, Shanghai Jiao Tong University in China and the University of Edinburgh in the United Kingdom jointly established the One Health Center, in collaboration with many institutions, including Yale University, Swiss Tropical and Public Health Institute, Hong Kong Baptist University, etc., with ambitions on scientific research, education & training, advocacy & dissemination, and international cooperation & technology transferring. Therefore, launching a new journal on One Health has been conceived to contribute significantly to implementational researches of the One Health approach. This journal provides a resource platform that disseminates knowledge, real-world research findings, and lessons learnt from programs on health for the human-animal-environmental interface at local, regional and global level, in order to reduce the inequity of health issues in the world and promote more advanced research on One Health. Such a mission is supported by sharing consistent ideas on emerging topics of interactions between
human health, animal health, and environmental health, based on the principle of “One World, One Health” [11].

To achieve its original goals, the journal will focus on the One Health issues in a systemic approach, including governance capacity, zoonotic diseases, antimicrobial resistance, food safety and food security, vector-borne diseases, environmental contamination, global climate changes, and other health threats shared by people, animals, plants, and the environment. In addition, this journal discusses global health issues, especially, worldwide health improvements that fully includes mental health, reduction of disparities, technical assistance & development, global health security & policy, and protection against global threats that disregard national borders.

Science in One Health is going to publish research findings in areas covering, but not limited to, (i) theories on One Health, global health, pathway of the One Health approach, (ii) implementational projects through transdisciplinary, cross-region, multi-sector cooperation, (iii) specific scientific emerging topics on good governance, developing world, inequity, zoonosis, AMR, food security, infectious diseases, biosafety, animal health, environment health, ecological security, public health, (iv) technologies on big data platform building and computation, and detecting infections cross-transmitted through human-animal, human-environment, animal-environment, and human-animal-environment interfaces.

5. Conclusion

Nowadays, One Health approach has been accepted by scientists, public health practitioners and international communities and has been applied to tackling complex health problems. With more researches on One Health, we expect more cost-effective and cost-benefit models on how One Health approach can truly contribute to improved well-being and sustainability in different socio-ecological settings and ultimately the whole world. This, in turn, will also impact the One Health action plan which is being jointly proposed by the WHO, OIE, FAO, and UNEP. Our newly launched journal, Science in One Health, will therefore also provide a new platform and resource for demonstration of research findings on One Health, illustration of case studies applied to the One Health approach and putting forward new opinions on transferring One Health concept into public health operations, thus, strengthening the One Health cooperation, promoting One Health actions in the real world, and advance science development in One Health [6]. We welcome the whole scientific and global health community to submit articles and share opinions to Science in One Health.

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Availability of data and materials

The full study protocol and the datasets, are available, following manuscript publication, upon request from the corresponding author (ZOUH Xiao-Nong, zhouxn1@chinacllc.cn, xiao-nong.zhou@sjtu.edu.cn).

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Authors' contributions

ZXN is the co-corresponding author. Conception and study design: ZXN and TM. Data collection: ZNX and TM. Writing-original draft: ZXN. Critique of writing-review & editing: ZXN and TM. Writing final draft: ZXN and TM.

Declaration of competing interest

Both Xiao-Nong ZHOU and Marcel Tanner are the Editor-in-Chief of Science in One Health. They were not involved in the peer-review or handling of the manuscript. The authors have no other competing interests to disclose.

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Abbreviations

| Acronym | Description |
|---------|-------------|
| AMR     | Antimicrobial resistance |
| AVMA    | American Veterinary Medical Association |
| COVID-19| Coronavirus Disease 2019 |
| EcoHealth| Ecosystem Health |
| FAO     | Food and Agriculture Organization |
| NGO     | Non-governmental organizations |
| OHC     | One Health Commission |
| OHHLLEP | One Health High Level Expert Panel |
| OIE     | World Organization for Animal Health |
| SARS    | Severe acute respiratory syndrome |
| UNEP    | United Nations Environment Programme |
| WHO     | World Health Organization |

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