"Virus War": The Competition between International Research Networks Combating Infectious Diseases in the Asian Region

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ABSTRACT

The objective of this paper is to examine the international research networks combating infectious diseases in the Asian region. This paper will shed light on the problems of Japanese networks by comparing them with those of the University of Oxford Wellcome Trust (UOW).[i]

Infectious diseases such as malaria, tuberculosis, and Spanish flu have existed since ancient times. Until the 1950s, infectious diseases used to be the main causes of death in people, but now cancer, and cerebrovascular and cardiac disease have gradually become the most common reasons for death. In 1980, when the World Health Organisation (WHO) declared the "eradication of smallpox", infectious diseases seemed to belong to history; however, new infectious diseases, such as Ebola hemorrhagic fever (1976), human immunodeficiency virus (HIV) (1981), and severe acute respiratory syndrome (SARS) (2003) emerged and currently there is the fear that new influenza viruses will spread through the mutation of avian influenza, commonly known as "bird flu". In 1997, 70% of humans infected by avian influenza died and in 2009, the H1N1 pandemic killed 17,853 people (214 nationalities). [ii]

In order to try and combat these infectious diseases, several research networks such as the Pasteur Institute (France), the University of Oxford Wellcome Trust (UOW) (UK), the Center for Disease Control (CDC) (USA), and the Japanese International Cooperating Agency (JICA) (Japan) have begun research in Asia (Kato and Shigenobu, 2007; Shigenobu, Kato, and Abe, 2006). In Japan, the Ministry of Education (MEXT) initiated a new project for infectious diseases through RIKEN (The Institute of Physical and Chemical Research) organising the Global Research Network on Infectious Diseases (J-GRID) in 2005. Through J-GRID, various Japanese university medical schools Thailand and Indonesia (Nagai, 2007).

Despite these initiatives, this paper argues that J-GRID cannot win the "virus war" in Asia as it must compete with UOW which can effectively use its networks within Asian countries which have existed since the establishment of the British Empire. Through these networks UOW can acquire virus strains (pathogenic organisms) and other important data. In contrast, it is difficult for J-GRID to build relationships of trust with doctors in Asia and to find out the latest information on virus strains, cases and vaccines. UOW can raise a large amount of funds from the private sector but J-GRID can use only public funds and has severe budget restrictions (Shigenobu, Kato, and Abe, 2006).

I. Introduction

This paper is divided into three parts. Firstly, pandemic disease will be described in terms of "Infection has no borders but the study of infection has borders". A summary of established infectious diseases such as malaria and tuberculosis and newly emerging ones including Ebola hemorrhagic fever, HIV and SARS will be given. Secondly, the international networks researching infectious diseases in Asia that compete with each other for virus strains and information on cases and vaccines will be examined. Thirdly, JICA's networks regarding infectious diseases will be compared with UOW's.

II. Emerging Infectious diseases and re-emerging infectious diseases

Infectious diseases, such as plague, malaria, and tuberculosis, have existed since ancient times. For instance, from 1347 to 1351 the "Black Death" plague originated in China, spread along the Silk Road and swept through Asia, Europe and Africa (Wade, 2010). As a result, the world's population declined from 450 million to between 350 and 375 million and Europe lost around one third of its population. The plague continued to spread sporadically to parts of Europe until the 17th century. iii The 1918 flu pandemic ("Spanish flu") is another example of a decimating infectious disease. From June 1918 to December 1920, the pandemic spread even to the Arctic and remote Pacific islands. Between 50 and 100 million people (3% of the world's population at that time) died, and some 500 million people (27% of the world's population) were infected (Taubenberger and Morens, 2006). It can be said that the Spanish flu pandemic was one of the deadliest natural disasters in human history.

Until the 1950s, infectious diseases were the main cause of death in people, but now more deaths result from cancer and cerebrovascular and cardiac disease. For example, in 1980, WHO declared the "eradication of smallpox". Smallpox had killed an estimated 400,000 Europeans per year during the 18th century and an estimated 300–500 million people died due to smallpox during the 20th century. A world-wide campaign to eradicate smallpox was launched in the 1950s. The strategy was called "ring vaccination", which tried to stop each outbreak of smallpox from spreading by the isolation of cases and the vaccination of everyone who lived close to infected people. In 1967, WHO decided to contribute $2.4 million annually to eradicate smallpox eradication and organised a network of consultants to assist countries in setting up surveillance and containment activities. As a result, the campaign was finally successful in eliminating smallpox. iv

While infectious diseases seemed to be a thing of the past, human beings are now facing the fear of a pandemic of newly emerging infectious diseases such as Ebola hemorrhagic fever (1976), HIV (1981) and SARS (2003). Ebola hemorrhagic fever first broke out in Zaire and Sudan in 1976. Fatality rates from Ebola were approximately 90%, which is the highest of any human pathogenic virus (King, 2008). HIV causes acquired immunodeficiency syndrome (AIDS). AIDS was first clinically observed between 1980 and 1981; and in 1983, two separate research groups led by Robert Gallo and Luc Montagnier independently published their findings about AIDS in the journal Science (Gallo, et al, 1883; Barre-Sinoussi, et al, 1983). From 1981 to 2006, more than 25 million people died from AIDS. Between November 2002 and July 2003 the SARS, pandemic, originating in Hong Kong, resulted in 8,422 cases and 916 deaths worldwide. v

In 1997, human infection from bird flu spread with 70% of infected people dying. The fear grew that new influenza viruses would emerge through the mutation of bird flu viruses. Estimates from Japan's Ministry of Health, Welfare and Labour (MHWL) predicted that if 25% of Japan's population was infected by the new influenza, there would be would be 11-25 million hospital patients and that the death toll would be 200,000 people with a fatality rate of 0.5% . [vi]

Infectious diseases were on the decline until the 1970s when they re-emerged and posed further health hazards to humans. It can be said that infectious disease has entered a new era in that they were previously localised epidemics but globalisation has resulted in outbreaks of viruses across the world.

III. Competition between International Research Networks combating Infectious Diseases in the Asian Region

(1) Problems of the JICA network:

Historically, JICA has provided various kinds of infrastructure such as hospitals and medical laboratories and technical assistance to developing countries in Asia and Africa. In 1979, for example,JICA's grant aid meant that the Noguchi Memorial Institute for Medical Research in Ghana developed into the biggest medical institute in Africa. However, there have been a number of problems related to JICA's assistance. Many medical institutes constructed with JICA's support have a very tenuous relationship to Japan. Even in Ghana, JICA's contribution for the Noguchi Memorial Institute for Medical Research has been forgotten, although it was evaluated that JICA's technical assistance was effective in early phases of the development (Oshitani and Saito, 2008; Ohta 2008). The reason for this is that JICA has to withdraw when institutes develop their research ability and become independent. It can be pointed out that Japan needs to establish continuous relationships with institutes after JICA withdraws (Nagai et al, 2009).

(2) SARS:

As has been mentioned, SARS emerged in 2003 from Asia and spread to the rest of the world. Medical institutes in several countries prevented SARS from spreading further. In France, the Pasteur Institute started to study SARS and collected various types of data including virus strains. On the other hand, China and Vietnam refused to provide such virus strains or pathogenic organisms to Japanese researchers. Japan could acquire only one virus strain from WHO and none from countries in which SARS spread (Nagai et al, 2008).

Why could Japan not acquire such virus strains? The reason for this is that a virus strain is considered to be "intellectual property" and so countries which have information on SARS do not want to provide it to other countries. For example, Vietnam's government did not permit Japan to use virus strains even though Japan was providing ODA to Vietnam. In contrast, even though it had withdrawn from Vietnam as a former colonial power, France continued to maintain a close relationship with Vietnam regarding the study of infectious diseases. Before SARS emerged, Japan could access information from developed countries such as the USA, the UK and France; but Japan recognised it was difficult to access patient information when new infectious diseases emerged. Japan keenly felt the importance of establishing a system to collect virus information from a security standpoint (Nagai et al, 2008).

(3) Japan Initiative for Global Research Network on Infectious Diseases (J-GRID)

In Japan, it was considered that infectious diseases were things of the past and the number of young doctors studying infectious diseases decreased. In addition, budgets for the study of infectious diseases were relatively small. In order to change this situation, in 2005 MEXT and RIKEN started a new project for infectious diseases called the Japan Initiative for Global Research Network on Infectious Diseases (J-GRID). This project was to establish research institutes in regions which had a high possibility of infectious diseases emerging. Various schools of medicine in Japanese universities participated in the project and established joint research centres with universities in China, Vietnam, Thailand, Indonesia, and other countries. The universities' strategy was to use networks developed in foreign countries with hospitals and medical institutes that had benefited from JICA's assistance (Kato et al, 2007).

In 2005, five Japanese universities and institutes formed various kinds of research centres: Osaka University collaborated with the National Institute of Health in Thailand. Nagasaki University established a research organisation with the National Institute of Hygiene and Epidemiology in Vietnam (Kinoshita, 2008). The University of Tokyo formed international research centres in China with several research institutions including the Institute of Biophysics, the Chinese Academy of Sciences, Harbin Veterinary Research Institute, and the Chinese Academy of Agricultural Science. The National Center for Global Health and Medicine collaborated with Bach Mai Hospital and other hospitals in Vietnam. The National Institute of Animal Health formed joint research facilities with the National Institute of Animal Health in Thailand. In addition, RIKEN established a support office for these joint research institutes in Asia (Nagai et al, 2009).

In 2006 several other Japanese universities also formed research centres in other regions using ties with research institutes which had been constructed with JICA's assistance. For instance, Okayama University worked with the National Institute of Cholera and Enteric Diseases in India, which was constructed with JICA grant assistance in 1998(Takeda, 2008). Hokkaido University utilised the Samora Machel School of Veterinary Medicine, University of Zambia which was formed by JICA's financial assistance in 1985 (Sugimoto, 2008). Kobe University formed a research centre in the Tropical Disease Centre, Airlangga University, Indonesia which was established with JICA's grant assistance from 1991 to 1993 (Hotta, 2008). In total, from 2005 to 2006 six Japanese universities established ten research centres to collaborate with Asian research institutes (Nagai, 2007).

(4) Oxford University Wellcome Trust versus J-GRID

This section will treat the OUW network as a case study of an international network on infectious diseases. The UK has a long history of research on infectious diseases in Asia in order to protect the health of its colonial settlers and recognising that infectious diseases were a security issue. In 1970, the University of Oxford started a joint study of infectious diseases in Thailand and expanded the network to include Myanmar, Sri Lanka, Kenya, Vietnam, Nigeria and other countries. In 1991, Oxford received funding from the Wellcome Trust and established the Oxford Centre for Tropical Medicine (Nagai, 2007).

OUW formed several research centres in Kenya, Vietnam and Thailand. The research centre in Vietnam was established in 1991 with six British and 60 Vietnamese members of staff. The leaders of this centre are Prof. Nicolas White, Director of the Asian Region, and Prof. Jeremy Farrar, Director of the Vietnam Centre. The Vietnam Centre has produced excellent results in its studies of malaria and dengue fever and was successful in developing a theoretical framework to apply to human infection of bird flu. [vii]

The Thai Centre is set up in Mahidol University's Faculty of Tropical Medicine. The Director is the above mentioned Prof. Nicholas White, and there are nine British and 183 local members of staff. The centre was established after the Wellcome Trust provided a total of £9 million. viii

IV. Analysis: The problems of J-GRID in Comparison with the Oxford and Wellcome Trust

(1) The problems of JICA assistance

Although JICA has provided a huge amount of infrastructure building and technical assistance to developing countries Japan has only a weak connection with Asian countries regarding the study of infectious diseases. The recipient countries became independent after JICA withdrew from the various projects and no system was established to ensure that the medical infrastructure constructed with JICA assistance could be used by Japanese researchers and organisations after JICA withdrew. As a result, recipient countries in Asia tend to forget Japan's contribution and Japan could not join the network of countries researching infectious diseases. OUW can effectively use its network of Asian countries which began in the colonial period of the British Empire. When SARS emerged in 2003, Japan could not obtain important information or SARS virus strains. As a result,in 2005, Japan established its own network called J-GRID in order to carry out joint studies of infectious diseases with Asian countries. Nevertheless, J-GRID is the weakest of the international networks studying infectious diseases as Japan could not build relationships of trust with doctors in Asia, and it is still difficult for Japan to access the latest information concerning virus strains, cases, and vaccines (Nagai et al, 2009).

(2) Funding ability

The funding resources of OUW and J-GRID will now be compared. J-GRID has a budget of 2.5 billion yen per year provided by MEXT from public funds. There are several restrictions on budget implementation. For example, Japanese universities and research institutes which participate in J-GRID could not employ foreign researchers as full-time staff even if they held a doctoral degree from a highly ranked university. This is because of the regulation that full-time staff paid with public funds should be treated as Japanese civil servants. On the other hand, OUW has funds of around £13 billion (2.6 trillion yen) per year (Nagai et al, 2009). These are private funds that are collected from individual citizens and private organisations. OUW can hire a large number of researchers from the host country of the research centre as full-time staff and only needs a small number of British staff in each centre (Nagai, 2007).

It is difficult for J-GRID to access private funds that are comparable to those of OUW because Japan does not have a culture of donations in which non-profit organisations such as the Wellcome Trust can collect large charitable sums. In addition, preferential tax treatment for donations is undeveloped in Japan (Nagai et al, 2009).

(3) Participation in networks

In addition to the two limits mentioned above, foreign enterprises cannot participate in J-GRID because of a regulation that foreign enterprises are prohibited from using Japanese public funds. Moreover, Japanese universities cannot take information about virus strains, cases, and vaccines out of Japan even if they have joint research centres in Asian countries (Nagai et al, 2009). In contrast, OUW is a multinational organisation in which researchers and private companies can freely participate.

(4) Human resource development

J-GRID does not have an adequate system to award Ph.D degrees to foreign researchers who participate in the program. JICA has scholarships for overseas students, such as the JDS programme, but J-GRID cannot use it and as a result is not able to attract many young researchers from Asian countries. On the other hand, the University of Oxford has accepted many young researchers as Ph.D candidates who return to their home countries after being awarded a doctoral degree to work in OUW research centres. As a result, OUW can successfully extend its human resource networks in Asian universities (Nagai et al, 2009).

(5) Relationship with public administration:

The compartmentalised public administration and sectionalism in Japan's medical science are also problems for Japan. Concretely, there is a conflict between MEXT and MHLW over administrative authority. MEXT has the authority to supervise "research activities" of individual doctors and research institutes such as schools of medical science at universities whilst MHLW has the regulatory power of "prevention" and "clinical" practice in the field of medicine. In an extreme instance Japanese doctors who engage in research and clinical activities are supervised by both ministries who may give different administrative guidance. Another example concerns Japan's National Institute of Infectious Disease which is the main medical institute for the prevention of infectious diseases in Japan. The Institute is supervised by MHLW and as it is not a MEXT-controlled research institute for medical science it could not participate in J-GRID. This is despite the fact that the institute has its own original networks with international organisations such as WHO and CDC and it has established an Asian network for prevention and clinical practice of infectious diseases (Nagai, 2007). In sum, through regulations and administrative guidance, university-based researchers can participate in J-GRID but clinicians cannot.

In contrast, the projects of OUW are not publicly administered and there are no regulations or guidance from bureaucratic organisations. In the UK, there is no division between "prevention","research", and "clinical practice" in medical science and the purpose of the networks is not to "help Britain"(Shigenobu et al, 2006). Thus, OUW can gather private funds and human resources in order to work with enterprises and non-profit organisations from around the world building on its long established networks of relationships.

V. Conclusion

In conclusion, this paper compares the J-GRID research network on infectious diseases in Asia with OUW in order to shed light on the problems of J-GRID. In 2005, MEXT, JICA, RIKEN and a number of Japanese universities organised J-GRID to create joint research centres in China, Vietnam, Thailand, Indonesia, and so on. However, J-GRID is not competitive in the "virus war" as it is difficult for it to acquire virus strains or up-to-date information on cases and vaccines. There are several reasons for this. Firstly, J-GRID could not build good relationships of trust with Asian countries because Asian countries seemed to forget Japan's previous contributions after JICA withdrew from medical infrastructure building. Secondly, J-GRID's funding ability is limited as it can use only public funds provided by MEXT. It is difficult for J-GRID to raise private funds because Japan does not have a strong culture of donation and there are restrictions on budget implementation including ones on employing and awarding degrees to foreign researchers. As a result, J-GRID is restricted in its ability to attract talented researchers from Asian countries. Foreign enterprises and NPOs cannot join J-GRID because of the regulation that foreign organisations are prohibited to use Japanese public funds. Moreover, Japanese universities are severely restricted in their freedom to transfer information about infectious diseases with their joint research centres in Asian countries. Finally, the sectionalism between MEXT and MHLW also restricts the activities of J-GRID. On the other hand, OUW has constructed longstanding effective networks with Asian countries to exchange information on virus strains and other important research data.

In order to compete more effectively in the "Virus War", Japan should construct an "all Japan team" consisting of several ministries, such as the Ministry of Foreign Affairs, the Ministry of Finance, MEXT and MHLW, together with JICA, universities and other interested groups in order to overcome compartmentalised public administration. It is necessary to reform the tax system to encourage donations from Japanese enterprises which have branch offices in Asian countries. And through the implementation of deregulation policies, Japan should construct a system that can fund, infrastructure, access information, and use human resources to effectively carry out research on infectious diseases.

NOTE

[i] Oxford University & Welcome Trust (OUW) homepage. Available at http://www.well.ox.ac.uk/home

[ii] World Health Organization (2010) "H1N1 in post-pandemic period". Available at

http://www.who.int/mediacentre/news/statements/2010/h1n1_vpc_20100810/en/index.html

[iii] U.S. Census Bureau (2012). "Historical Estimation of World Diseases". Available at

http://www.census.gov/population/international/

[iv] WHO Factsheet (2007). "Smallpox". Available at

http://www.who.int/mediacentre/factsheets/smallpox/en/.

[v] World Health Organization (2003)."Summary table of SARS cases by country, 1 November 2002 - 7 August 2003". Available at http://www.who.int/csr/sars/country/2003_08_15/en/index.html.

[vi] Inter-ministerial Avian Influenza Committee (2007). "Pandemic Influenza Preparedness Action Plan of the Japanese Government". Available at

http://www.mhlw.go.jp/english/topics/influenza/dl/pandemic02.pdf

[vii] World Health Organization (2005) "The Writing Committee of World Health Organization

(WHO) Consultation on Human Influenza A/H5. Current Concepts. Avian Influenza A(H5N1)

[viii] Oxford University & Welcome Trust (OUW) homepage. Available at http://www.well.ox.ac.uk/home

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