

# A Public Understanding of Science: A Case Study of Bird Flu Crisis in Hong Kong

LI Hang

## Introduction

One of the most routine observations about modern life concerns the rapid pace of technical change and its consequences for every aspect of society. For instance, issues such as the BSE crisis and genetically modified food are subject to heated and unresolved scientific controversy. Meanwhile, public concerns about those issues are also very high. However, the image of scientific illiteracy for lay public is common: lay public are viewed as the receivers of scientific knowledge.

Sociologists have long investigated on how public understands science in different situations. From those findings, the lay knowledge of risks is more reflexive. These empirical findings also mirror theoretical discussion in the role of lay public plays in the transformation of modernity (see Giddens, 1990, 1991; Beck 1992 and Wynne 1996). However, the views on the role of lay public are diverging. While the reflexive modernization perspective regards lay public as the rational-calculative actors, the cultural/hermeneutic perspective recognizes their diverse, multi-layered knowledge of risk and science.

This paper looks at how lay people engage reflexively or otherwise in science and risk. It explores the ways in which people construct their knowledge of risk in the context of their everyday lives. It takes a specific example of bird flu crisis in Hong Kong and investigates the responses of two groups of people: poultry farmers and bird-watchers in Hong Kong.

## Background

The curtain rose on the bird flu crisis in April 1997 when 4000 H5N1-infected chickens died. However, this did not cause public alarm until the virus, which had no known effect on humans before, took a 3-year-old boy's life in August – the first case of this kind in the world. The alarm quickly died down as no new cases came to light. In the meantime, a team of scientists from the World Health Organization came to Hong Kong to work with the Department of Health to trace the source of the lethal virus.

Few days later, the seriousness of that state of affairs became apparent, with more cases of human deaths as well as massive number of deaths of chickens at a

---

Li Hang received his MA in Sociology at the University of Essex. He is now pursuing PhD study at the Department of Sociology, The Chinese University of Hong Kong. He can be contacted at [lihang@cuhk.edu.hk](mailto:lihang@cuhk.edu.hk).

poultry farm. It was at this critical juncture that the Hong Kong government took action by putting the Chief Secretary for the Administration in charge of a task force to resolve the health crisis. The immediate step was to slaughter all 1.3 million chickens in all poultry farms in Hong Kong. It was a drastic decision that led to horrendous scenes of slaughter, but it did stop the bird flu in its tracks. H5N1 killed six out of 18 infected people during this outbreak.

There were also sporadic outbreaks in local poultry farms and human infected case of avian flu after 1997. Repeated bird flu outbreaks prompted the Government to implement several preventive measures in order to lower the risks of further outbreak and, more importantly, to prevent the creation of a mutated virus that is able to leap the species barrier and infect human. The role of scientists became important as the Government always judges its policy on scientific ground. Scientists found that since the virus spreads from the intestines of poultry through fecal matter, a simple mechanism of transmission could be that it gets on people's shoes and when people take off the shoes, the virus gets on to their hands. But it remained a mystery why no poultry worker who have the greatest exposure to chickens had become infected. Scientists also admitted that, in the case of H5N1, the role of migratory birds is very important: the birds spread the disease to ducks, geese and then chicken. Therefore, the Government not only requires local poultry farms to improve their hygiene facilities (e.g. setting up the disinfection pool or spray facilities at the farm entrance), but also introduces the bird-proof nets to prevent the intrusion of migratory birds. Apart from migratory birds, there are also some other suspected mechanism of transmission. Professor Robert G. Webster, director of the World Health Organisation's animal flu testing centre, described Hong Kong's wet markets, where are the major places that sell live poultry in Hong Kong, as the 'missing link' in the origin and spread of bird flu. Thus, the Government had started analyzing how central slaughtering could reduce the risk of bird flu.

The latest outbreak of bird flu in Asia was unprecedented and a cause for alarm. Since mid-December 2003, a total of ten countries and places in the Region have been affected. These include South Korea, Japan, Vietnam, Thailand, Cambodia, Pakistan, Mainland, Taiwan, Indonesia and Laos. Laboratory-confirmed human deaths have so far been identified in Vietnam and Thailand, both with very widespread outbreaks in poultry. As of 9 September 2004, 40 cases of H5N1 infection have been confirmed in these two countries, of whom 29 have died. H5N1 has spread from China to the neighbouring Vietnam and also to South Korea, Taiwan and Japan. Again, the experts suspect that possibly because migratory birds have been carrying the virus in their stomachs and spread to different countries. The WHO experts say this is probably the main explanation for the simultaneous outbreaks being witnessed across Asia.

As a precautionary measure, the Hong Kong government decided to close the Mai Po Nature Reserve (MPNR), where is a major bird-gazing place in Hong Kong, and aviaries in urban parks to the public in order to minimize human exposure to wild birds, which could carry the bird flu virus. The spokesman of WWF said there is no scientific evidence that migratory birds are the source of the spread of avian flu in Asia and thus the Government's action was overcautious. Finally, MPNR was reopened two months later as the outbreak of bird flu was controlled.

## **Perspectives on Public Understanding of Science**

### *Literatures on Public Understanding of Science*

In the last decade, the public understanding of science has emerged as a novel focal point for work in social studies of science. There have been two dominant approaches to empirical analysis in this area: on the one hand, large-scale surveys of public knowledge of, and attitudes to, science and on the other, case-study analyses of the public's understandings of science in particular contexts.

These two approaches are characterized as the 'positivist or traditional PUS' and the 'interpretationist or critical PUS' (Michael 2002). The positivist or traditional approach to public understanding of science aims, in principle, to measure levels of scientific literacy by large-scale surveys (e.g., Durant, Evans, and Thomas 1989). Early research began with much concern about 'understanding,' that is, what the public knows and does not know about science. The underlying concern was the modernist, or enlightenment, assumption that a certain level of scientific literacy or understanding was requisite in order for modern democratic societies to flourish. Practitioners of this approach considered science to be a fixed body of knowledge; saw scientists as having the primary, if not the sole, claim to expertise; and viewed the public as passive recipients of science. As such, this approach has been criticized as deploying a 'deficit model' (e.g., Wynne 1991, 1992, 1995) by focusing on the extent to which lay people's knowledge falls short of accredited scientific knowledge. The conceptualizations of the public, of understanding, and of science by traditional PUS is criticized as inappropriate – or, specifically, sociologically naïve (Wynne 1989; Michael 1996).

The alternative tradition in PUS is the critical strand primarily identified by its use of qualitative techniques. The critical approach has a keen interest in the cultural context of the public understanding of science. In particular, it has tended to focus on the understanding of what has been called "lay local publics" (Michael 1998). This tradition of research considers both scientific knowledge and lay knowledge to be in large part local. All knowledge is structured by its respective local cultural and social conditions.

In this paper, one of the aims is to move away from the 'deficit model' of public understanding to focus on the diverse, intuitive knowledge about science among different publics. This study also employs the qualitative approach, which is commonly used by the interpretationist PUS to explore in detail the diverse and dynamic ways in which lay people respond to science and risks.

### *Beck: Lay and Expert Knowledge in the 'Risk Society'*

This paper uses the sociological theory of 'risk' as a starting point, for it provides us insights about the relationship between experts and lay public and thus shapes the analysis of the public understanding of science. 'Risk' is a concept which has been much theorized by Ulrich Beck. Beck (1992) argues that an older industrial society, whose axial principle was the distribution of 'goods', was being displaced by an emergent 'risk society', structured, so to speak, around the distribution of 'bads'. In risk society the distribution of hazards seems blind to inequalities and they flow easily across national and class boundaries. Risk society is recognizable not only by the problematisation of objective physical-biological dangers, but also fundamentally by a

principle of individualization, in which agents become ever more 'free' from the normative expectations of social institutions.

For Beck, individualization is a default outcome of a failure of expert systems to manage risks; neither science, governance, media, commerce, law nor even the military are able to provide sufficient closures of risks to enable people to place their trust in these institutions. As a consequence, people are thrown back onto themselves, they are alienated from traditional communal systems but have nothing else to turn to instead. Hence, responsibilities for decisions which entail risks become personal and private: to eat or not to eat hamburgers; to have sex or not to have sex; to have or not to have a pre-emptive mastectomy because one has been identified as having a specific gene linked to breast cancer (Beck-Gernsheim, 2000). There is nothing free about this individualization as it is forced upon us by default. The choices one has to make are not free choices, but informed by incomplete information from not always trustworthy sources.

In risk society the assessment of risk is subject to a high degree of ambivalence, due to the complexity of society and technical knowledge. In the early days of industrialization, risks and hazards were evident to the senses. In contrast, many of the major risks today largely escape perception, for they are 'localized' in the sphere of physical and chemical formulas (Beck 1992:21). These risks exist in scientific knowledge rather than in everyday experience. Expert knowledges tend to contradict each other, resulting in debates over standpoints, calculation procedures and results. Science itself fails to respond to the large-scale, indeterminate nature of contemporary hazards. Hypotheses about their safety cannot be tested empirically and science has little power to intervene in a context in which the world has become a laboratory for testing how hazards affect populations. Scientists have therefore lost their authority in relation to risk assessments: scientific calculations are challenged more and more by political groups and activists (1995:125-6).

Beck (1992:59) is critical of experts' positioning of lay people as ignorant, merely requiring more information about risk to respond appropriately. He argues that lay people's apparent 'irrationality' in relation to risk is a highly rational response to the failure of technico-scientific rationality in the face of the growing risks of late modernity. The response of individuals is to become critical of these dangers generated by early modernity and its drive towards industrial production. Beck claims that this is already happening in diverse forms in organizations such as the green movement but also among members of the general public.

Lay people have become more reflexive<sup>2</sup> about science, because they are aware that science has produced many of the risks about which they are concerned and that scientific knowledge about risk is incomplete and often contradictory, incapable of solving the problems it has created. There is a continual definitional struggle over risk, particularly between those who produce risk definitions (principally experts) and those who consume them (the lay public).

---

<sup>2</sup> Beck (1994, 1996) contends that the use of the term 'reflexive' in his concept of reflexive modernization does not denote mere 'reflection' but rather 'self-confrontation'. The move towards reflexivity is an unintended side-effect of modernity, or rather the hazards produced by modernity as part of its project (1996:28). It is the process of modernity coming to examine and critique itself.

*Wynne: Private Reflexivity and Lay Expertise*

As Beck has pointed out, as a consequence of modernization and individualization, increasingly more aspects of life are considered to be subject to human agency. People are expected to take personal responsibility for these choices, and to follow their own interests. It is clear that many aspects of people's lives are influenced by their awareness of risk and the responsibilities involved in avoiding risks. It is also evident that individualization, which emphasizes personal responsibility for life outcomes, is dominant in late modern societies. Many people appear to have accepted the notion that one should make oneself aware of risks and act in accordance with experts' risk advice so as to prevent the impact of risk.

Accepting personal responsibility for risks and taking up experts' risk advice, however, are not the only responses to risk, as noted by Wynne (1989, 1992 and 1996). The notion of reflexivity itself suggests a rational, calculating actor: people are portrayed as choosing rationally between various perspectives on risk provided by expert knowledge systems. It also appears to give credence to the role played by experts in constructing risk meanings over that of lay actors. The 'Risk Society' thesis implies that individuals develop and exercise reflexivity in response to expert knowledge, rather than generating their own risk knowledge through their own experiences of the world. While Beck acknowledges that reflexivity is practised in the sphere of the intimacy and the everyday life, he tends to suggest that this reflexivity is again primarily exercised in response to expert knowledge systems. He gives little recognition to the ways in which lay actors draw upon their own situated knowledges of the world in constructing risk understandings and responding to experts' pronouncements on risk (Wynne 1996). Wynne argues that a central part of the reflexive process of lay discomfort, alienation and distance from expert knowledges and interventions is not the purely rational-calculative one which Beck conceives as the driving force of reflexive modernity. It is the more thoroughly hermeneutic/cultural one in which alien and inadequate tacit models of the human are imposed on lay publics through the discourse of 'objective' science in fields such as environmental and risk management and regulation. Wynne further suggests that "this neglect of the cultural/hermeneutic character of modern knowledge, specifically of modern scientific knowledge itself, seriously constraints the imagination of new forms of order and of how their social legitimation may be better found" (1996, p.45).

While risks may be debated at the level of expertise and public accountability, they are dealt with by most individuals at the level of the local and private. As Wynne argues, lay knowledges tend to be far more contextual, localized and individualized, reflexively aware of diversity and change, than the universalizing tendencies of expert knowledges (Wynne 1996: p.70). Lash and Wynne (1992; see also Wynne 1996) highlight what they see as the multi-layered response to risk on the part of lay people as form of 'private reflexivity' which, they argue, must be the basis for the more public forms of reflexivity.

Wynne argues that what is central to the compilation of official information on risk appears to be a deeply embedded assumption that it is only scientific knowledge which merits the status of 'expertise'. However, it must be recognised that in the context in which information based on technical expertise is to be implemented, it is frequently the public who are the experts. This lay expertise, founded on experience in a particular social world, does not of necessity invalidate technical expertise, rather it

brings an added dimension of understanding to the complexity of social life, essential if official information on the avoidance of risk is to be followed successfully. However, this dimension seems to be a factor which remains largely disregarded or unrecognised when risk information on scientific or technical matters is delivered to the public. Risk, it could be argued, is seen by the policy makers in a one-dimensional context, rather than being part of a multi-dimensional, complex and socially embedded process as argued by Wynne.

Wynne offers a different interpretation of public risk perception that 'grounds their rationality in social experiences and processes' (1989:35). He argues that the dominant perception of the problem – how to defend scientific rationality against uninformed and disorderly subjectivism – is fundamentally flawed. What is taken by technical experts and policy makers to be an irrational rejection of scientific information, may instead be a rejection of naïve assumptions about an ideal world, both social and material, which is embedded in the 'expert' model of risk taking. There is of course a danger of idealising lay expertise, thus it is necessary to acknowledge that lay experiences may be subject to the same process of construction as the experts' knowledge.

### **Literature Review**

Sociological research investigating the ways in which logics of risk are established, maintained or revised as part of individuals' location with specific sociocultural settings points to the complexities and ambiguities of lay knowledge formation. It shows that these alternative rationalities, often portrayed by experts as inaccurate or irrational, often make sense in the context of an individual's life situation, including the cultural frameworks and meanings that shape subjectivity and social relations and the institutions and social structures within which individuals are placed. The reflexivity of lay people in relation to risk may develop from their observations of the ways in which everyday life operates and from conversations and interactions with other lay actors.

Macgill (1989) looked at the competing logics of risk emerging in relation to an alleged link between radioactive discharges from a nuclear processing installation at Sellafield in the north of England and an increase in the incidence of leukaemia and other cancers among children in the surrounding area. She found that among the residents of Seascale, a village close to Sellafield and therefore most directly 'at risk', there was a wide diversity of opinion concerning the risk of radioactive discharges from the installation, ranging from those who were very concerned about the risk to those denying that there was a risk. Expert assumptions about 'the public view', therefore, served to homogenize what was a diverse range of attitudes and feelings about alleged risk. Based on her finding, Macgill argues that people's perceptions and understandings of risk are established over a lifetime of personal experiences as well as their location within social milieux and networks of communication. These include their use of the mass media and conversations with others as well as expert knowledges.

There is another well-known case study, Brian Wynne's analysis of sheep farming in Cumbria (north-west England) after fall-out from the Chernobyl explosion (Wynne 1992). Rainfall, which coincided with the passing of the remnants of the radioactive plume, caused upland sheep-farming areas to become contaminated.

Against official expectations, this radioactive contamination persisted in the vegetation and in the flocks which fed on it [see also Wynne, 1994]. Wynne relates how proposals to deal with this problem offered by official scientists neglected to take account of expertise which the sheep-farming community believed it possessed. For example, one suggestion made by the visiting scientists was that changing the acidity of the soil should encourage the radioactive material to become trapped in the ground, thus progressively removing it from the vegetation and, therefore, the sheep. They proposed to test this procedure by running a series of experiments in which sheep were penned in restricted areas while the soil-conditioning chemical was applied at various concentrations. Farmers objected that sheep did not thrive if penned, and Wynne relates that the experiments were called off as inconclusive since the condition of the sheep declined on account of their confinement. In this case, it is the deafness of recognized scientists to the knowledge of others, and not the public's problematic understanding of science, that is the core issue in the public's relationship to scientific expertise. A similar point arose in relation to officials' suggestions that the sheep be purged of the radiation by moving them on to lower-lying pastures which had not been contaminated. Farmers insisted that this was no solution at all, since summer feeding on the lower pastures would exhaust the resource needed to sustain the flocks over winter.

According to Wynne's analysis, when farmers encountered the messiness of day-to-day science, when they saw how readings could vary over small distances and how difficult it was to get a stable figure for background radiation, the farmers revised their notion of scientific knowledge. This change was neatly captured in a story Wynne told about the live monitoring of sheep. One farmer, wrote Wynne, saw that just over ten sheep out of a sample of a few hundred failed the contamination test. They were too highly contaminated for release. Then the farmer recounted how the monitoring scientist "said, 'now we'll do them again' – and we got them down to three!" (Wynne, 1992, p.293). Because the monitoring device had to be held against the rear end of the sheep and because, as the farmer noted, "sheep do jump about a bit," it was hard to get consistent readings. The farmer could see that what ended up as a fact about contamination started off as a messy and uncertain operation. For the farmer, the mystique and authority of other official data records began to evaporate, too. The credibility of expert opinion was revised, indeed renegotiated, during the farmer's encounter with scientific practice.

Other case-study analyses of the public understanding of science have indicated that members of the public are very capable of acquiring scientific knowledge and responding to the demands of technical debate when they are highly motivated to do so. Whether the stimulus is personal ill health leading to investigation of medical knowledge about one's condition (the determination of some HIV/AIDS sufferers and those in high risk groups to understand and participate in medical trials is probably the best-known example, see Epstein, 1995), personal dietary choices leading to intense interest in nutritional science (see Lambert & Rose, 1996), or concern about an environmental hazard leading to engagement with officially recognized knowledge about contaminants (see Irwin 1989, 1995), case studies have shown that members of the public (and often their legal representative) can some to be skilled users of scientific knowledge and able participants in scientific argument.

## Questions

Case studies in the public understanding of science suggest that in circumstances where the public is deeply affected by the application of scientific understanding to issues of public concern, there are usually questions: (1) about the public's assessment of the scientific expertise, (2) about the scientists' understanding /misunderstanding of the public's knowledge, and (3) about the negotiation between public and experts knowledge. As informed by previous literatures, three research questions are asked: (1) To what extent is trust in scientist's assessment of risk being undermined by poultry farmers and bird-watchers? (2) How do lay frames of reference differ from scientist's one? (3) How far might lay people be involved in shaping scientific knowledge?

## Findings

In-depth interviews with affected poultry farmers and bird-watchers provided data for analysis of the factors influencing their understanding of risk and science in the case of bird flu crisis. Interviews lasted for an average of one hour each, and anonymity was guaranteed. There are 151 licensed local chicken farms and 134 farms are currently under active operation (Health, Welfare and Food Bureau, The Government of HKSAR 2004). There are around 600 bird watchers in Hong Kong. Six interviews were conducted, comprising three poultry farmers and three bird-watchers of a wide age range, from 24 to 55.

As inspired by the past literatures, there are several key topics that have been covered in the interviews:

- Awareness of debates about bird flu (e.g. via the media);
- Personal responses to the bird flu crisis;
- Understanding of the term 'bird flu';
- Views of the cause and consequences of bird flu;
- Views about the government's handling of the bird flu crisis;
- Views about the role of 'science' and 'scientific expertise'.

Five key themes related to public understanding of science and risks will be summarized from the data. An interpretative account will be provided, with key themes illustrated by quotes from the participants. Interviewees will be identified by their interviewee type: namely, poultry farmer (P) and bird-watcher (B).

### *Lay understanding of risks: varying "technical" knowledge of complex science*

A key theme was the variation in the "technical" knowledge of complex science. While expressing greatly increased awareness of the bird flu issue through widespread media coverage, the majority of the interviewees felt that they had little in-depth knowledge of the precise scientific arguments of bird flu. They perceived such knowledge as complex and uncertain, even for scientists. While they respected experts' suggestions on the measures about the outbreak of bird flu, they did express their doubts about the certainty of the scientific judgements,

All the experts' suggestions must be good, and we could also see their suggestion works that the bird flu stopped eventually in the 1997 outbreak by large-scale slaughtering of all chicken. However, does it mean that it is the only way to deal with it? I strongly believe that there are other means...



(P2)

I must trust them, because they are the experts, the measures suggested by them must be good. They just don't know the real situation of a poultry farm. They don't know how much money we should spend in order to meet the requirements. From my experience, with or without such measures, the possibility of outbreak is the same. (P1)

However, a lack of detailed "technical" knowledge was not evident among all the lay participants. In particular, interviewees from the bird-watcher group seemed to possess considerable knowledge of the debate about bird flu. They demonstrated their knowledge not only of the scientific methods, but expressed detailed thoughts about the wider social, commercial, and environmental implications of this issue,

I am not studying biology, chemistry or environmental science; however, I suspect the bird flu this time actually comes from chicken farms themselves. However, they are also innocent. You can see the farming environment from TV. Chicken are living in a congested cage. They have no chance to do exercise as usual. What are they eating? Man-made artificial meal. What is it in fact? Meat from dead body, died fish, bone and even drops of pigs. What medicine do the chicken take? Antibiotic and flu injection. Pigs also take several kinds of medicine. Very close contacts between chicken, pigs and human increase the chance of infection, it can also be said that it is the result of rapid urbanization. (B2)

Even for the majority of participants who felt that they had limited in-depth understanding of bird flu, complex understanding of some of the scientific issues and the relationships between science and society did emerge when prompted in more depth.

#### *How much do the experts know? The uncertainty of scientific knowledge*

Across the array of interviewees, concerns about bird flu often centered on the perceived uncertainty of "expert" scientific knowledge. A recurring criticism was made of the short term perspective held by Government, which were seen as a failure to address the real causes of bird flu,

This decision (to close MPNR) smacks of 'knee-jerkism', and a desire to be seen as doing something, while at the same time ensuring that something causes minimum inconvenience to the government. It is also cheap...no compensation for slaughtering chickens, and no mainland authorities to get angry when imports are banned. (B3)

The government's measures are to pacify the public; frankly speaking, I don't think bird flu can be eradicated from the face of the Earth if the Government and the experts as well don't have a long term perspective. (P2)

In particular, Government's decision to close the MPNR has been criticized among members from bird-watcher group. They did not only criticize the overcautious reaction of Government but also questioned about the experts' judgement on the role of wild bird in spreading the virus. They questioned them by their 'local' knowledge from the bird watching experience. They also complained about both the judgement of scientists and the decision of the Government that it

would let the people have a misconception about the origin of bird flu,

Wonder how close we can get to the birds via bird-watching! I certainly do not go around touching feces and licking my fingers. It seems to me that we're more prone to be infected with the virus by going to the market than bird-watching at somewhere quiet in Hong Kong. (B1)

Facts don't fit migratory birds as carriers of the virus: dates of their migrations and outbreaks do not match; and this artificially created flu at poultry farm kills wild birds too. (B3)

I really think that AFCD (Agriculture, Fisheries and Conservation Department) should not say this (i.e. wild bird is one of the sources of spreading the virus)! All the people think that only bird watching is dangerous now. Have they ever thought that the wild birds are one of the victims? Since Mai Po was closed, I have heard a lot of people saying that destroying Mai Po or killing wild birds would prevent the virus spread, but they have never noticed that the sparrows and doves were sharing the same water and food with all other chickens! This maybe one of the ways how wild birds are infected. (B2)

For the poultry farmers, they all claimed that bird flu exists all the time and they were also infected by 'bird flu' some time. They see bird flu as a usual flu as human flu and claimed that the experts has exaggerated the power of bird flu. They also expressed feelings of fatalism about human capacity to avoid potential risks to be infected by bird flu and questioned about the expert's 'overcautious' reactions,

I am not a doctor, but I know human did catch bird flu in the past. When my chicken got flu, I got at the same time. It just depends on one's health condition. (P2)

Though I think there must be the possibility of human-human transmission, I think the possibility of dying from car accident is much higher. (P3)

*A missing piece of puzzle in science: the limitation of scientific knowledge*

A key aspect of the interviewee's concern about the possible causes of the outbreak of bird flu is the congested and filthy condition of modern poultry farms. One of the interviewees from the group of bird watchers doubted that why there is no scientist researching about the link between industrialization of agriculture and the outbreak of bird flu, and described this as a 'missing piece of puzzle in science,'

Chickens are forest birds; virus is not natural to them. If flu crosses species barrier from domestic ducks to chickens, the virus starts evolving. With mass farming, evolution can be more rapid, though it is a bit of speculation, but not ridiculous at all. (B3)

Just look at the filthy conditions of these chicken farms as can be seen on TV news. It has left me without doubt that the extremely poor hygiene environment in these poultry factories is the key source of bird flu or other diseases for that matter. However, I can't see any scientists would like to say anything about this, it just appears as a missing piece of puzzle in scientific arguments. (B1)

Not only members from the group of bird-watcher, even the poultry farmers in this study also pointed to the industrialization of agriculture as a possible cause of the outbreak. One of the interviewee from this group even admitted that poultry farmers, who are all greedy for money, are responsible for the outbreak of bird flu,

If the living size per chicken is decreasing, the chance of spreading bird flu will increase, this is my own experience. In the past, one chicken lives in four-feet space, now is one feet per chicken. Chicken getting flu was very common in the past, but as the scale of farm is increasing, as you can see that there are more chicken than human in the Guangdong province, the chance of outbreak must increase. (P3)

Everybody is greedy for money, they all want smaller farm but larger number of chicken. As the condition of the farm is getting worse, the chance of outbreak of bird flu must increase. If there was no outbreak of bird flu, the living space for chicken would be decreased. (P1)

It is our, and also Government's, responsibility. No one was willing to improve the living of chicken before the outbreak of bird flu, but actually not even now. (P2)

#### *'Birds are the victims': a critique of anthropocentrism in science*

There is another key theme which was recurring among the bird watchers. They observed that the whole discussion of bird flu was centering on the well-being of human population. They criticized about the human intervention in nature. They thought that birds as well as all the entities in nature are the victims of human intervention. Thus, they saw the outbreak of bird flu as an inevitable consequence of human civilization. If we do not stop intervening in nature, the emergence of new virus is inevitable. One of the interviewees also drew upon the BSE crisis as an example of human suffering from own doing,

Personally speaking, I really disagree with that bird flu was spread by wild bird. They are in fact the victims. They are killed because of our human behavior. Human never respect others - animals, plants and their living environment. (B2)

Actually it is a natural process for virus to find a new host for their survival; it is part of their natural evolution. Do we need to accommodate with nature, or does the nature need to change because of us? I think we should accommodate with nature and evolve with the nature. Though the H5N1 strain can be stopped this time, we are still not immune to all other unknown virus in nature. (B1)

Blaming it on migratory birds is unfair. Remember the mad cow disease not long ago, it's all part of human's own making! (B3)

One of the interviewees also observed a relationship between medical science and anthropocentrism. Medical science was regarded as a discipline which concerns

only the well-being of human, and thus, the expert's suggestion systematically ignored the well-being of all the other entities in nature,

In the discourse of medical science, human life is placed on top of other life in nature. Human life is the most valuable that should be protected even at the expense of the life of animals or plants. We can see that millions of chicken have been slaughtered in order to protect our life. I think this is not a long term solution. If there is infected person, we must try to cure them; if there is one infected chicken, we will kill millions of them ... I think we should live in harmony with nature, it is the only fair way of living to all kinds of life-form on earth. (B3)

*'Centralized Slaughtering is an inevitable trend': diverse interests of the public*

One of the controversies in the bird flu issue is the suggestion of centralized slaughtering of chicken in Hong Kong. Experts said that it is an efficient way to prevent another outbreak of bird flu in Hong Kong. Though interviewees in this study all agreed that centralized slaughtering is an inevitable future for the chicken meat market in Hong Kong, they did not agree with the scientific judgement that it can prevent further outbreak. They thought that people in the near future will like to have a market with better hygiene standard, and centralized slaughterhouse must be able to meet this requirement. However, they did not regard this as a permanent solution to bird flu. Opinions among interviewees were diverging. Interviewees from the group of bird watchers insisted that the traditional way of selling live chicken has its own cultural value and should be protected. Interviewees from the group of poultry farmers admitted that they wanted the traditional way of selling live chicken to be protected as their business can be saved,

Hong Kong's unique cuisine and food culture should be protected. Though centralized slaughterhouse should be the future trend, I think the Government should provide different choices for the public. There are still many people who love to eat chicken that are bought from local wet market. (B2)

The shift to centralized slaughtering is evitable ... If we [the poultry farmers] oppose it now, centralized slaughterhouse will still be established ten years later because people's habits will change from the old style to a more hygienic one in the future ... of course I want it to be implemented as late as possible because it's related to my business. (P1)

## **Conclusion**

This paper, drawing on sociological perspective on risk and the public understanding of science, has illustrated the value of an interpretative qualitative approach for exploring the complex meanings, processes and social contexts which shape people's understandings of science and risk in the specific example of bird flu. In this paper, several key themes have been detailed: varying "technical" knowledge of complex science, the uncertainty of scientific knowledge, the limitation of scientific knowledge, and the critique of anthropocentrism in science.

By employing the qualitative research method, this paper demonstrated the complexities and subtleties of the public understandings of science and risk, giving a much richer description of the pattern of social relations between scientific experts and lay public. For example, rather than treating “the public” as a uniform group, this research had explored the diversity of understandings across different social groups, namely the poultry farmers and bird-watchers, who are part of the public. Furthermore, rather than adopting a “deficit model” of lay knowledge, this paper showed the problematic divide between lay and expert knowledge by highlighting the “lay expertise” possessed by certain part of the public.

This paper seems to provide support to Ulrich Beck’s ‘Risk Society’ thesis. At first sight, the risk of bird flu was largely invisible, lethal and could easily flow across national boundary. Moreover, the emergence of bird flu coincided with global political, economic, social and cultural developments that might signify an ‘end’ of industrial modernity. The role of scientific experts had been questioned; their risk assessment was of high degree of ambivalence. The suggested measures and their account of the possible causes of the outbreak had also been challenged. However, the findings of this paper showed that lay public knowledge was more diverse and complex than what Beck’s thesis has illustrated. The findings showed that lay knowledge was more contextual, localized, individualized and multi-layered, which had large parts overlapping with Wynne’s arguments and other related empirical researches. Three main features of lay knowledge will be discussed below.

Firstly, as reflected from the findings, trust in experts is not purely rational-calculative, but rather a ‘sense of inevitable dependency’ (Wynne 1996). All the interviewees did show ‘respect’ to the experts as they claimed that they had little in-depth knowledge of the precise scientific arguments. However, when they were probed in more depth, a sense of ambivalence to experts has been shown. This sense of ambivalence could be illustrated by the interviewees’ responses to the suggestion of centralized slaughtering of chicken as a means to prevent further outbreak of bird flu. As revealed in some public poll, most of the people opted for the centralized slaughtering, the interviewees also showed positive attitudes towards this suggestion when first asked about it. However, their positive attitudes were not originated from their trust in experts; rather they saw centralized slaughtering as an inevitable trend. The interviewees also showed reservation about this suggestion when asked in more depth. Therefore, the observed trust was rather a dependency on the experts. At the private level, ambivalent attitude towards experts exists and this could be revealed by using the qualitative approach as shown in this paper and other similar empirical research.

Secondly, the frame of reference of the public about the causes of bird flu was different from that of experts. From the findings, it showed that lay public generated their risk knowledges through their own experiences of particular social context. For example, interviewees used their ‘local’ knowledge to make judgements on the causes of bird flu. The poultry farmers based on their experience, hypothesized that when the living size per chicken decreases, the possibility of the outbreak of bird flu increases. They linked up the outbreak of bird flu with industrialization of agriculture. Interviewees from the group of bird watcher also expressed similar concerns. However, the experts did not concern much about the conditions of poultry farm as a possible cause of bird flu. The divergence between expert and public knowledges about risks came from the difference between their ‘cultural’ contexts. Both expert

and lay knowledge embodied different social assumptions and models framing its language of reasoning.

Thirdly, as shown in the findings, the lay knowledges of risks directly challenged experts' knowledges of risks in some aspects. For example, considering about the role of migratory bird in the spreading of bird flu, interviewees not only expressed their reservation to experts' judgement but also regarded experts' judgement as false. Interviewees also criticized science about its anthropocentric orientation in its assumptions. The views of these individuals had illustrated the potential for the development of "lay expertise" among certain "publics" and thus suggested the fluid and contested nature of the "expert-lay" divide in relation to the knowledge of complex science.

In conclusion, following a sociological perspective on risk and public understanding of science, the reported research was concerned with the broader social and cultural factors that might shape the lay understanding of science and risks. By examining public understandings of, and attitudes towards scientific knowledge, it demonstrated the much needed improvement of our "scientific understanding of the public" (Nelkin 1989). By providing insights into the ways different "publics" perceived science and scientists, this research might also inform mechanisms to facilitate a greater public acceptance of science.

#### **Reference:**

- Beck, U. 1992. *Risk Society*, Sage, London.
- , 1994. "The Reinvention of Politics: Towards a Theory of Reflexive Modernization" in Beck, U., Giddens, A. and Lash, S. eds., *Reflexive Modernization: Politics, Tradition and Aesthetics in the Modern Social Order*. Cambridge: Polity.
- , 1995. *Ecological Politics in an Age of Risk*. Cambridge: Polity.
- , 1996. "World Risk Society as Cosmopolitan Society? Ecological Questions in a Framework of Manufactured Uncertainties". *Theory, Culture & Society* 13(4): 1-32.
- Beck-Gernsheim, E. 2000. "Health and Responsibility: From Social Change to Technological Change and Vice Versa" in Adam, B., Beck, U. and Van Loon, J. eds., *The Risk Society and Beyond: Critical Issues for Social Theory*. London: Sage.
- Duran, J.R., G.A. Evans, and G.P. Thomas. 1989. "The public understanding of science". *Nature*, 6 July, 11-14
- Entwistle, V., M. Renfrew, S. Yearley, J. Forrester and T. Lamont. 1998. "Lay Perspective: Advantages for Health Research?", *British Medical Journal*, 316 (7), 463-66.
- Epstein, S. 1995. "The Construction of Lay Expertise: AIDS Activism and the Forging of Credibility in the Reform of Clinical Trials", *Science, Technology & Human*

*Values* 20(4): 408-437.

Health, Welfare and Food Bureau, the Government of HKSAR. 2004. *Prevention of Avian Influenza: Consultation on Long Term Direction to Minimize the Risk of Human Infection*. Internet resource:  
<[http://www.info.gov.hk/info/flu/eng/files/avian\\_flu\\_consultation\\_e.pdf](http://www.info.gov.hk/info/flu/eng/files/avian_flu_consultation_e.pdf)>.

Irwin, A. 1989. "Deciding about risk", in Jennifer Brown ed., *Environmental Threats: Perception, Analysis and Management*, 19-33. London: Belhaven Press.

-----, 1995. *Citizen Science: A Study of People, Expertise and Sustainable Development*. London: Routledge.

Lambert, H and Hilary, R. 1996. "Disembodied Knowledge? Making Science of Medical Science", in Alan Irwin and Brian Wynne eds., *Misunderstanding science? The public reconstruction of science and technology*. Cambridge, UK: Cambridge University Press.

Lash, S. and Wynne, B. 1992. "Introduction" in Beck, U., *Risk Society*. London: Sage.

Loon, Joost van. 2002. *Risk and Technological Culture: towards a sociology of virulence*. New York : Routledge

Michael, M. 1996. "Ignoring Science: Discourses of ignorance in the public understanding of science." in Alan Irwin and Brian Wynne eds., *Misunderstanding science? The public reconstruction of science and technology*. Cambridge, UK: Cambridge University Press.

-----, 1998. "Between citizen and consumer: Multiplying the meanings of the public understanding of science". *Public Understanding of Science* 7: 313-27.

-----, 2002. "Comprehension, Apprehension, Prehension: Heterogeneity and the Public Understanding of Science", *Science, Technology & Human Values*, 27(3) 357-378.

Nelkin, D. 1989. "Communicating technological risk: the social construction of risk perception." *Annual Review of Public Health*, 10: 95-113.

Wynne, B. 1989. "Sheepfarming after Chernobyl: A Case-Study in Communicating Scientific Information". *Environment* 31(2): 10-15, 33-9.

-----, 1991. "Knowledge in context". *Science, Technology & Human Values* 16: 111-21.

-----, 1992. "Misunderstood misunderstanding: Social identities and public uptake of science". *Public Understanding of Science* 1: 281-304.

-----, 1994. "Scientific Knowledge and the Global Environment", in Michael

Redclift and Ted Benton eds., *Social Theory and the Global Environment*. London: Routledge.

----- 1995. "The public understanding of science", in S. Jasanoff, G.E. Markle, J.C. Peterson, and T. Pinch eds., *Handbook of science and technology studies*. Thousand Oaks, CA: Sage.

----- 1996. "May the sheep safely graze? A reflexive view of the expert-lay divide", in S. Lash, B. Szerszynski, and B. Wynne eds., *Risk, environment and modernity*. London: Sage.

### 公眾對「科學」的認識：香港禽流感個案研究

本文旨在研究現代社會中大眾(lay people)如何反思式地參與建構他們日常生活中對科學和危機的有關知識。本文以 2003 年香港的一次禽流感爆發為個案，分別訪問了本地雞農和觀鳥愛好者兩類人士，探討他們的觀點和知識與科學的解釋究竟有何相同或相異之處。