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Background Paper

3.2 b Evidence on and lessons from short-term socio-economic impacts of HPAI

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Summary

Socio-economic issues are those that concern the livelihoods and welfare of people and the strength of economies. Why are we concerned? Pragmatically, it is more likely that people will comply with measures that enhance their livelihoods or at least do minimum damage and are implemented in ways that take account of cultural norms. From a political perspective, it is preferable to apply measures that balance the needs of one's constituents and do not damage the economy. Countries that have signed up to the millennium development goals have a commitment to protect their most vulnerable citizens.

This section reviews the immediate impacts that arise from fears of disease and outbreak control measures, while section 3.2.c discusses the impacts of longer term changes to biosecurity. The majority of evidence is drawn from studies managed by FAO, with sources provided in the background material.

Market shocks originating from consumer fears and country protective action may occur during and even before outbreaks. During the first wave of outbreaks in 2004 consumers switched from poultry to other meats, import bans were imposed on live birds and chilled meat and international trade volumes fell. International prices rose by nearly 20%, but domestic prices in affected countries dropped sharply. Since 2005 global trade has almost recovered but there has been a shift in exports from Asia towards Latin America. Many economies reported local shocks. Studies from six countries show a consistent pattern in the first shock of a steep fall followed by quite rapid recovery. If disease outbreaks recur the shock diminishes but studies from Vietnam show a long term loss of demand of around 6% in the delta areas. In Jakarta, a sudden announcement of strict control measures after a series of media stories about human deaths resulted in a severe market shock and continued market instability. It seems that little can be done to avoid shocks since HPAI is perceived by consumers as a food safety problem. Effective communication and marketing should be promoted to reduce their length and severity.

The best way to minimise economic and livelihood damage is to find disease outbreaks as soon as they occur and respond quickly. This requires excellent **disease intelligence**. Designing an animal health information system requires not only a scientific understanding of surveillance but an ability to take into account the institutional setting ("rules of the game"). Different incentives are needed to promote reporting from sector 1 and 2 systems compared to sectors 3 and 4, with a good understanding of motivations to report (or not). Models for sectors 3 and 4 have been tested e.g. in Viet Nam, Indonesia and Thailand but they have not yet been subjected to socio-economic analysis to assess their start-up costs (which will almost always need external funding) and minimum maintenance requirements (which must be internally funded).

When an outbreak occurs, **culling** will be one of the first stamping out actions. This causes loss of livelihood, and the threat of culling discourages reporting and encourages panic selling. A well designed **compensation** scheme can reduce the damage but not remove it since compensation schemes never cover all of the value of lost production and may exclude the most vulnerable people. Some reports suggest that there are unresolved gender issues; women are predominantly the owners of small flocks in poor families but may not receive compensation. Countries are progressively reviewing their strategies but many lack funding to implement them. Sustainable strategies must focus on minimising culling. Viet Nam has used vaccination to reduce the down number of outbreaks and hence culling levels and has raised compensation rates. Thailand has used tracing and selective culling to reduce the number of birds killed. Culling has been observed to cause distress to owners and culling teams and resulting loss of trust. Yet there has been little progress in introducing humane culling methods in the worst affected countries.

Outbreak control contingency plans seldom give sufficient thought to the **recovery phase**. Uncertainty over restocking disrupts livelihoods and can result in long term loss of market access for smallholders. An effort needs to be put into synthesising existing information on coping and recovery strategies and support mechanisms in order to build them into contingency plans.

Ring vaccination used in a stamping out programme has the potential to substantially reduce culling and disruption of livelihoods. **Preventive vaccination** can be used to reduce the risk of outbreaks. It may be used in government campaigns to reduce the transmission and cost of disease or by farmers as insurance for their own farms. Cost effectiveness of delivery and cost sharing between government and farmers will be important in making vaccination sustainable. The cost of a single vaccination has been estimated at between US 6 and 16 cents, with full protection of a layer costing up to 50 cents, depending on local delivery conditions and the type of vaccine. Until more is done to establish systems such as compartmentalisation, vaccination will remain a difficult choice for exporting countries.

More work is needed to assist with prioritisation, targeting and full economic analysis of **outbreak control systems and strategies**. There is a need to move on from examining single measures to reviewing packages of measures and their impact on livelihoods and gender dynamics including the special problems of vulnerable groups. Desktop simulation exercises and value chain approaches are being used as a way of bringing disciplines and organisations together.

Setting the scene

Socio-economic issues in disease prevention and control are those that concern the livelihoods and welfare of people and the strength of economies. Why are we concerned?

HPAI presents a particular challenge because the fear of a human pandemic has placed its control firmly into the category of a global public good and created a sense of urgency, leading to control measures that are rapid, drastic and widespread. Consumers have treated the disease as a serious food safety problem, leading to market shocks that exacerbate the economic impact, while producers and others who make a living from poultry have been less inclined to change their behaviour.

It is more likely that people will comply with control measures that enhance their livelihoods or at least do minimum damage and are implemented in ways that take account of cultural norms. From a political perspective, it is preferable to apply measures that balance the needs of one's constituents and do not damage the economy. Countries that have signed up to the millennium development goals have a commitment to protect their most vulnerable citizens. Control of HPAI presents a particular problem because poultry systems are the most globalised and the most diverse of all livestock species, owned by both the poorest and the richest livestock keepers.

All of the available reports for developing countries show that the smallest flocks fulfill multiple livelihoods objectives (consumption, social, sales, insect control, companionship) while small commercial flocks represent a route out of poverty and have been widely promoted as a development tool. Based on studies of the socioeconomic impacts of HPAI outbreaks in Asia 2004-2005, it seems unlikely that widespread hunger from direct unavailability of food will result from HPAI outbreaks (extract from [FAO, 2006a](#)). This is because poultry does not form a large part of the caloric intake of most diets, especially among poorer households. However, protein and micronutrient deficiencies are possible if the effects of HPAI last more than a few months. There could be short-term impacts on food security if outbreaks cause vulnerable households to lose their poultry assets or sales and, thus, their means to acquire other sources of food.

In the medium and longer term backyard and smallholder poultry keepers may be targeted by stricter regulations as they are often perceived as less biosecure. Furthermore, shifts in consumer demand towards more highly-processed poultry products could mean small poultry producers lose out further, resulting in a loss of livelihood opportunities for poor people, especially rural women .

Market shocks

Market shocks originating from consumer fears and country protective action (e.g. import bans) may occur during and even before outbreaks.

A symposium held at the end of 2006 (extract from [FAO 2006b](#)) highlighted that there are differences in impact according to the production sector (1-4) and at different points in market chains. These impacts are directly linked to the chronology of disease effects, in particular: the initial market shock (mainly driven by consumer fears); the effect of control measures imposed by governments (market restrictions, movement control, depopulation); the recovery process (which may take place at different speeds in different parts of the poultry sector).

Consequently, losses and benefits may be differently distributed. Both of these points make the case for disease control strategies that are fine-tuned to knowledge of the poultry sector. For example:

- o In sectors 1-2, the primary concern is for rapid recovery of lost markets which may hinge on international trade agreements. With sufficient information and renewed market access these sectors can be very resilient. However, they are not immune to shock - several quite large producers in the case study countries have gone bankrupt;
- o Sector 3 is dependent on markets that may be subject to shocks and closure. It is also, as we reviewed in the breeding stock discussion, a sector which poses considerable risk for both disease transmission and market impact shocks.
- o Poultry has multiple uses in Sector 4. This sector has lack of access to information, is vulnerable to loss of assets and income for even short periods, and tends to recover slowly. Although not connected as strongly to formal markets as sector 3, severe depopulation, combined with movement controls, affect restocking.

There has been a strong private sector effort to coordinate activities with government as HPAI control is widely agreed to be an international public good, largely because of its actual and potential impact on human health. It is clear that HPAI outbreaks (the ones that cause major market effects) are occurring in the context of an already volatile poultry market.

Global and Regional Market shock (extract from [McLeod et. al 2005](#) and [Morgan 2006](#))

During 2004 to 2005, avian flu outbreaks in Asia prompted the imposition of import bans on poultry products from disease-affected countries. The global market impact of these bans included a progressive shortage of poultry meat supplies, escalating world poultry prices, a sharp drop in global poultry trade, and trade diversion as countries scrambled to procure product from disease free countries. The overall price impact on poultry prices in 2004 and 2005 was aggravated by shortages of other meats, particularly beef from North America, a region which, while traditionally supplying one-quarter of world beef trade, is now banned by many countries due to BSE-concerns. This combination of effects contributed to a nearly 20 percent increase in international poultry prices over the period. These upward world price movements contrasted dramatically with declining prices in disease-affected countries as exportable supplies moved back into domestic markets. Demand declined as consumers responded to food safety and human health concerns. Consumption gains in Asia, which exceeded world averages over the past decade, slowed as consumers in 2004 switched to other protein sources which, along with a culling of flocks, prompted a decline in Asian production. On international markets, export shortages due to avian influenza (AI) and higher prices led to an unprecedented 8 percent decline in global poultry trade. Limitations on fresh/chilled product movement from Asian exporters, in particular Thailand and China, caused a decline in Asian exports which in 2003 exceeded 1.8 million tonnes to less than 1 million tonnes in 2004/5, or approximately 12 percent of global shipments

In late 2005/early 2006 AI outbreaks in the importing nations in Western Europe, the Near East, and Africa led to major consumption shocks and translated into shifting trade flows, dramatic price declines, and supply responses in both infected and non-infected countries. International poultry prices, after rising more than 30 percent in the context of reduced export supplies since 2003, plummeted nearly 20 percent between mid-2005 and the end of 2006 as AI was reported in over 40 previously unaffected countries in Europe, Middle East and Africa. In Europe where AI was reported in domestic poultry operations in 11 countries, prices in some markets dropped nearly 40 percent. Meanwhile, in uninfected markets, such as the United States and Brazil, the suppliers of 70 percent of global trade, prices dropped 40 and 25 percent respectively between mid to late 2005 and April 2006. These price declines were the barometer for an unprecedented 2 percent drop in poultry trade in 2006. This could potentially translate into potential trade losses

of up to \$2 billion in 2006. Trade bans were put in place for 9 exporting Western European countries where AI was identified in domestic poultry operations. Approximately 69 countries put bans on poultry products from the various affected Member countries within the EU-25. With short term consumption shocks in the EU-25, EU aggregate chicken prices declined by 15 percent in late 2005. Some recovery in consumer confidence in 2006 allowed export prices to recover but not yet to pre-AI levels.

A study modelling four HPAI scenarios and their impact on global meat markets included an examination of the relative impact of different outbreaks of animal disease, including AI, FMD, and BSE. It suggested that (extract from Cluff, 2006):

- o International market responses to animal disease outbreaks depend critically on the type of disease, the nature of consumer responses, the size of the market affected and trade linkages. Obviously, the impact of animal disease outbreaks, in the form of market losses, is highest for countries where the outbreak occurs and is in proportion to the country's export dependence.
- o Consumer reactions play an important role in determining the size of market losses associated with animal diseases, with non-disease infected exporters significantly and adversely affected. Government policies which seek to sustain consumer confidence could mitigate market losses, thus minimizing markets impacts, both in-country and globally.
- o Regionalization is a very effective instrument to limit market losses to countries that are experiencing an animal disease outbreak and to stabilize international markets.
- o A return to market equilibrium following a significant disease outbreak varies by disease and meat product. Despite the market shock of HPAI, poultry markets have rebounded relatively quickly, in contrast to beef markets which may take a decade to return to equilibrium.

Market shocks at country level

Since 2004, a series of studies have been carried out on the market impact of HPAI and the measures taken for control to provide information for animal health planners. Effects have been seen from one end of the market chain to the others, as illustrated by the following examples.

Consumer behaviour and market impacts in Vietnam (extract from FAO/MARD 2007)

Vietnam was one of the first countries to suffer from the Highly Pathogenic Avian Influenza (HPAI) outbreaks that began in Asia late in 2003 and continues to the time of writing. The government, private sector, local NGOs and the international community have worked tirelessly to understand the disease and progressively control it.

Viet Nam is undergoing rapid economic development, with annual GDP growth at 8.4 % and a reduction in the number of undernourished people from 21% in 1990-92 to 13% in 2002-4. Although approximately 70% of the population is rural, urbanisation is happening quickly. HPAI has invaded in four or five "waves" of outbreaks affecting commercial and backyard poultry alike, although recovery has been faster for the commercial producers. In the first wave, 58 of the country's 64 provinces were affected. With progressive improvement of control measures, the number of outbreaks in poultry has decreased. While the first wave resulted in the death or culling of approximately 44 million birds, in subsequent waves numbers from a few thousand to 4 million have died.

Prior to HPAI, the consumption of poultry meat in Viet Nam was expanding rapidly, from 2.5 kg of meat per capita in 1995 to 5.5 kg in 2002. Surveys carried out in Hanoi/Ha Tay (2003 and 2006) and Ho Chi Minh City (2006-7) suggest that consumer reactions may have contributed more than government regulations to the loss of poultry markets during the first wave of outbreaks in 2003-4. In Hanoi and Ha Tay, 74% of those surveyed temporarily stopped eating poultry meat, with some switching to substitute proteins. About 6% still do not eat poultry meat and around 60% have reduced the frequency and total amount of poultry meat consumption. In Ho Chi Minh City, 76% of surveyed households reported having reduced their consumption of poultry meat.

Consumer behaviour will probably continue to change the shape of the poultry industry, with a small but important shift towards buying in supermarkets, particularly in the south of the country. However, there is still a trust of birds bought from a farm or at least bought live. In HCMC the authorities banned poultry production and far fewer birds are bought from farms, but

some people do buy banned live chickens to eat. People still trust their own eyes and their own hygiene practices above any assurances or certificates.

There seems to have been a connection between the emphasis given in communications campaigns and the association of consumers that HPAI is a food related risk, although different consumers (rural/urban, older/younger) have different perceptions of risk and access to different kinds of information. In Ho Chin Minh City, for example, most people see TV and media rather than printed materials. Consuming poultry products does pose a risk to human health but only if they are incorrectly cooked.

Effect of market shocks and disease control in Turkey (extract from Yalcin, 2006)

A market shock and subsequent recovery occurred in Turkey, where HPAI outbreaks were declared on 7 October 2005 and then on 25 December of the same year. The first outbreak was quickly eradicated but the latter resulted in human deaths and caused panic among consumers, the impact of which lingered until mid-February 2006. Poultry meat markets collapsed and sales dropped 1-4% below pre-AI level, with prices dropping to a level much lower than the cost of production in the early days of January 2006.

A rapid market assessment concluded that in spite of the short duration of consumer panic resulting from disease outbreaks and human mortalities in Turkey, the poultry sector and its related industries (both upstream and downstream) were severely affected. The government was ultimately successful in controlling the second outbreak and gained valuable experience on how to manage contagious zoonotic animal diseases. However, even in this relatively well-managed response, there were severe economic consequences. The AI induced losses due to decreases in production levels and market prices of broilers are estimated to be 27,6 millions YTL and 101,9 millions YTL respectively.

The industry has been recovering, but several medium scale semi-integrated and integrated firms went bankrupt. However, survivors, particularly those invested in brand development, are likely to be better off in the future. Previously, consumption of commercial poultry meat and eggs by the rural families were negligible but as a result of bans on spent hen sales in local market, and de-population of backyard poultry, the industry has increased sales volumes in the rural markets.

However, poultry contractors seemed to be disproportionately affected by the outbreaks. These broiler and turkey producers lost on average 1 cycle of production due to the AI. Most of them are operating now but their future is very dependent upon the future of the integrated firms. Since the contracted farmers are not organized under producers associations and unions, they have limited political voice.

The psychology, nutrition and income of rural families were severely affected due to delayed restocking (due to the ban of the spent hens in rural market, most villagers could not find hens to purchase). They did not perceive as sufficient the compensation paid by the government since they not only lost income from poultry, but they become dependent on purchased poultry products in the market (indirect income loss).

During the crisis, the consumers, significantly lowered their protein intake and paid higher prices for substitute protein sources (red meat and fish). Most resumed poultry consumption by June 2006.

Effect of market shocks and disease control in Egypt (extract from Ghonem, 2006)

A rapid assessment of reimbursement (compensation) of smallholder and backyard producers in six governorates comes to the following conclusions.

In the light of the confusion that originated from the unexpected spread and extent of the disease, poultry production, in both industrial and traditional sectors, witnessed great losses. Nearly all parties believed that the losses could have been contained if the crisis had been managed in a different way.

In facing the disease, the government gave the industrial sector the first priority in every respect, which largely contributed to the relatively rapid rehabilitation of this sector at national scale.

The government also directed a number of measures to the traditional sector, such as the prohibition of breeding in urban areas, the regulation of live bird transport between different governorates, the prohibition of live bird trade and the free vaccination for birds in rural areas. The latter however covered in practice only a small percentage of birds in rural areas.

However, the current traditional poultry sector has generated concern as field visits and official statements assert that the disease is still affecting the traditional poultry sector in most, if not in all governorates. The lack of an accurate and credible database for the traditional poultry sector is still representing a serious threat to the effective and efficient containment of the disease. Another problem is the effectiveness and availability of vaccination. Last but not least, there is an obvious lack of trust between traditional producers and authorities that resulted from the great extent of losses, numerous painful experiences and a general feeling of neglect.

Case study: Effect of market shocks and disease control in Indonesia (from Krishnan 2007)

Box 2.. Food Stall Owners Face Uncertain Future

Theta Sutardi in Jatinegara, East Jakarta, is spooked (Jakarta, Feb 22, FAO). Since the announcement of the ban on raising poultry in the city and its suburbs, she and her children have stopped eating chicken. "Chicken in Jakarta have avian influenza and for that reason people are not allowed to keep them," she said. When reminded that well-cooked chicken is safe to eat, she replied: "I do not trust that. I'm still afraid." That said the protein intake of her five children now consists of *tempeh* (Indonesian version of fermented tofu) and salted fish. "My youngest child is only four and I don't want him falling sick. That's why I don't feed my kids chicken," she said sternly. Talk to Suprabowo, who runs a barbecued chicken stall in Jakarta's Blok M area, and he'll tell you what it is like to lose business because of avian influenza-scared customers. "When the ban was announced, my customers just dropped. Towards the end of January I only had one or two customers a day in my food stall. I was traumatized because I had debts to pay," he said. But business recently has picked up. "It might be the rains," he quipped. "People get hungry fast." Things, however, for Suprabowo are still difficult. "The optimal for me to break even a day is 20 customers, but it's still averaging about 10 to 15. Let's see, maybe I'll have to do some other business if things are bad." The already publicized plan to ban live chickens from entering Jakarta is also sending jitters down the spines of Jakarta restaurant owners. "I get my live *kampung* chickens from Yogyakarta, which is transported to our restaurant every week," said Tauchid Ibnu Yunus, manager of a popular local fried chicken chain of restaurants in Cilandak, South Jakarta. "Our regular customers would know the difference if we get chickens from anywhere else." "We'll have to close shop if the Jakarta administration bans the transport of live chickens into the city," he said alarmingly.

Disease intelligence

The only documented discussions on disease intelligence come from Viet Nam, Indonesia and Thailand although none of their experiences has been fully analysed from an economic perspective. An effective surveillance system combined with rapid response will greatly reduce the costs of future outbreaks. However, the problem of sustainable surveillance has not yet been solved. In searching for a solution it will also be necessary to consider the question of cost effectiveness.

Viet Nam is looking toward a future with reduced vaccination and, eventually, beyond AI. It will become increasingly important to find and respond to any outbreaks very rapidly (extract from FAO/MARD 2007). Two slightly different perspectives on approaches to sustainability are evident from studies carried out in the country. One focusses on the practical experience of putting community animal health workers (CAHW) in touch with district level veterinary (DVS) staff on a regular basis by establishing and maintaining networks of trained CAHW, and at the same time and using simple methods such as freephone numbers to make it easier for farmers to report. Another emphasises the importance of understanding the needs of people at different levels in the system for information and their motivation for supplying (or withholding) information. Pilots testing the perspectives have been run but no system has been tested for a long time or been subjected to a thorough evaluation to assess what will eventually prove to be sustainable.

There is a need for investment (especially in human resource capacity) needed to set up a system, and the need to find recurrent funding from sources other than the international community. During HPAI outbreaks contact was improved and DVS staff were provided with travel expenses but when the outbreaks finished the budget also finished. However, there is no clear agreement about the level and source of funding for surveillance or the extent to which it is necessary to institutionalise and quality-check the reporting system.

Culling and compensation

A joint World Bank, FAO, IFPRI and OIE study (2006) drawing also on the findings of a wider consultation (Hancock and McLeod, 2006), describe issues and good practices in designing compensation programmes.

Payment of compensation to farmers whose animals are being culled enhances producer cooperation through better motivation to comply with the disease reporting and culling requirements of disease control packages. It reduces the time lag between an outbreak and containment actions, and hence diminishes the overall cost of control. To the extent that it reduces the virus load, it also reduces the risk of the virus mutating to becoming transmissible from human to human. Enhancing early reporting and complete culling of diseased or suspected birds is thus the first objective of compensation schemes. A second objective can be to reimburse

losses of private citizens who have complied with a disease control process for the public good. This is compatible with the first objective.

Some of the findings of the compensation review are:

- Preparedness is key for an effective compensation system to function effectively
- Identification of beneficiaries who will mostly be poultry owners
- Type of losses to be compensated - which will mostly be direct losses although indirect and consequential losses can be much greater
- Setting appropriate compensation rates with the right incentive signals, based ideally on market values, and between 75% and 100% of an established market value for each category of birds.
- Establishing buy-in and awareness of appropriate responses by stakeholders - emphasising a multi-disciplinary approach to designing communication systems
- Identifying and developing practical Payment Systems to reach out to all affected producers
- Identifying medium to long-term ways forward, with modified stamping-out with reduced culling and funding from both public and private sources.

While the imperative of disease containment drives compensation schemes, the reality of the severe impact of culling on very poor people cannot be ignored. However, a compensation scheme cannot cover all livelihoods losses caused by livestock disease control and it cannot replace social safety nets. This requires other measures, outside the scope of discussions surrounding immediate control measures.

Vaccination (extract from McLeod et. al 2007).

This section summarises the economic issues related to vaccination against HPAI in developing countries as presented at the international meeting on HPAI vaccination in Verona, March 2007

Ring vaccination used in a stamping out programme has the potential to substantially reduce culling and disruption of livelihoods. Preventive vaccination can be used to reduce the risk of outbreaks. It may be used in government campaigns to reduce the transmission and cost of disease or by farmers as insurance for their own farms.

Most countries, and particularly the developing countries badly affected by HPAI, have a mixture of "sector" 1 to 4 production systems, feeding into different types of market chain. Different economic issues in each sector affect the incentive to take part in, or even initiate, vaccination programmes.

While biosecurity in sector 1 and 2 farms, the large commercial flocks, is expected to be good, and they can certainly afford to invest in measures to mitigate risk, the impact of a single disease outbreak in one of these flocks can be very large, travelling fast down long value chains and involving culling and compensation of large numbers of birds. They are also exposed to risk through trade. Sectors 1 and 2 are the most likely of all to carry out vaccination for insurance purposes or, when involved in a government programme, to be responsible for vaccinating their own flocks on a cost-sharing basis.

Sectors 3 and 4 are less likely to carry out routine vaccination as insurance, and more likely to be supported by public campaigns with a finite life and an exit strategy. Unprotected sector 3 farms represent a risk in that their flocks are exposed to disease from wild birds and farm visitors and they supply very active market chains into cities. A sector 4 farm, while it may be exposed to risk from a number of sources, if infected will not spread disease very far. Infection in sector 4 may be a greater threat to human health than to poultry health. Predominance of sectors 3 and 4 tends to be associated with weak animal health systems.

Perhaps the greatest incentive to vaccinate is the possibility of reducing the scale of culling, disposal and compensation. Depending on the system and the type of bird, the cost of culling, disposal and compensation for a meat bird may range from approximately US\$2 to ten times that amount. In contrast, the cost of protecting a bird by vaccination may be \$1 or less, and with a certification system perhaps twice as much. Where the risk of outbreaks is high, therefore, vaccination becomes economically attractive.

However, there is a disincentive to vaccinate where export is important, and where importing partners will not accept vaccinated birds. Given the relatively short life of most poultry and the fact that no country faced with widespread outbreaks has been able to eradicate disease quickly, it may be wise for countries to consider the introduction of vaccination at an early stage. This would be particularly attractive if compartments could successfully be established with vaccination permitted outside of exporting compartments.

Apart from purely economic motives, there may be a social incentive to use measures that limit culling in sectors 3 and 4. If culling is widespread this may cause a problem with restocking, particularly of local breeds and in some areas this may be a cause for concern about biodiversity, although the extent of the problem has not been fully documented.

The paper draws on data from three countries (Viet Nam, Indonesia and Côte d'Ivoire) to illustrate the costs of vaccination and discuss measures of cost effectiveness and ways to improve it. The countries examined took the decision to vaccinate at different disease-risk levels. For instance, Vietnam had already had outbreaks for a long period of time when the government took the decision to vaccinate. On the contrary, Côte d'Ivoire took the decision just after the official declaration of the HPAI outbreak to protect commercial flocks. In Indonesia where HPAI is endemic, the government is evaluating the possibility of vaccination.

The cost of providing a single dose to one bird was taken as the starting point for estimating cost-effectiveness. Viet Nam had the lowest cost of all three countries and approximately the same to vaccinate a single bird in all sectors at around 6 cents. For Indonesia the estimated cost to vaccinate a bird in sector 1-3 is approximately 8 cents, but the cost doubles in sector 4, in part because experience suggests that the number of birds vaccinated in a day will be very low. In Côte d'Ivoire, the cost to vaccinate a bird with one dose is approximately 7 cents in sectors 1-3 and 9 cents in sector 4. Very little investment has been needed in Côte d'Ivoire – the laboratory is already quite well equipped and no additional transport was expected to be required – and in sector 1-3 private veterinarians and farm staff can carry out most of the work.

Assuming that sectors 1 and 2 will largely take care of their own vaccination, the responsibility and cost to governments for these sectors will be those of quality control and monitoring biosecurity. Incentives to vaccinate may be linked to compensation schemes. If there is no compensation then the incentive to vaccinate as insurance will be very high; if a farm with a vaccination certificate can be excluded from culling of healthy birds, this also provides an incentive to vaccinate. "Sustainability" is not an issue in these sectors.

If HPAI control is considered a global public good then there is some argument for subsidizing preventive vaccination in sector 3. However, of all elements of the control strategy, vaccination is the one that farmers may be most inclined to finance for themselves, since it can confer private benefits. The cost can be subsidised if the government pays for monitoring and surveillance. It may also be possible to subsidize the cost of the vaccine, as Côte d'Ivoire has done, but not the cost of delivery. There is minimal incentive to vaccinate broilers unless HPAI can be combined with ND vaccine.

In sector 4 the decision to vaccinate needs to be based on local risk assessment. Sector 4 is highly variable and it needs to be deconstructed into "high risk" and "low risk" groups. Vaccination of sector 4 is most urgent where poultry and people are dense. In sparse populations, the virus may die out without strong control measures, and vaccine might be used to create barriers to spread and hasten dying out. Cost effectiveness means not only reducing cost but increasing coverage and this may be difficult to achieve for reasons described by others in this meeting. We must assume that sector 4 will never pay for routine HPAI vaccination. If vaccine is made continuously available and delivered by animal health workers, they will charge for it.

The simplest cost-effectiveness measures are the cost per dose delivered and the cost per bird protected. The ideal denominator will depend on the objectives of the programme. Important factors in cost effectiveness include "who controls?" (protection level may be affected by producer perception of risk); "who pays for what" (it is easy to subsidise cost of vaccine but harder to subsidise delivery cost for farmer-administered vaccination); and "who delivers" (it may be cheaper to contract out).

Recommendations on the issues discussed to date

Communication and markets

While dealt with in greater detail elsewhere, the importance of good communication needs to be highlighted in relation to public messages and their effect on markets. Well thought out communication messages are critical where the term aim is to balance risk reduction and reducing market shocks.

It appears that appropriate information delivered through a trusted medium can reduce market impacts (probably not the initial shock), with the question of trust very different in different cultures, countries and sectors.

- More understanding is needed to identify how access to information and types of information “motivate desired behaviour”. It is recognised that sectors 1-2, 3 and 4 may need different media and approaches – and in some cases information dissemination in local languages.
- There is also a need to continue to work on the information presented to consumers and their understanding of risk.

General recommendations relating to planning of disease control

Perhaps the most important message that can be sent out by authorities that rapid response and control provide a strong signal to restore consumer confidence and so to reduce impacts. When devising control strategies it is also important to think forward beyond the outbreak to restoration of markets and rehabilitation of the sector – and how the benefits will be distributed.

- More work is needed to assist with prioritisation, targeting and full economic analysis of outbreak control systems and strategies – not only single measures but packages of measures.
- Analysis of appropriate approaches to disease control, will need to balance epidemiological risk reduction, market realities and distribution of economic effects. There is value in examining all points on a market chain that constitute a potential risk – but this may require various organisations to be forthcoming with information
- There is a need to move on from examining single measures to reviewing packages of measures and their impact on livelihoods and gender dynamics including the special problems of vulnerable groups.
- Desktop simulation exercises and value chain approaches are being used as a way of bringing disciplines and organisations together.

It is a priority to continue efforts to develop and institutionalise cost-effective and sustainable disease intelligence systems. A number of pilots have been carried out that provide valuable lessons, and the time is ripe to review and consolidate these lessons.

The costs and effects of large scale culling, and the costs and difficulties in implementing appropriate compensation schemes, clearly need to be minimised, to reduce impacts of HPAI. A more efficient (targeted) culling process will depend on better reporting, greater cooperation in culling, and alternative control and prevention systems in place.

Compensation needs some further work, ensuring that analysis translates into capacity building and policy change. In this regard, it will be important to further assist developing countries (working with the private sector) to use risk assurance schemes as a means to provide compensation, and working out country specific public operational plans to cover all smaller scale dispersed producers.

It will be important to make vaccination cost effective, and pay attention to cost sharing. In Vietnam, for example, it is the intention is to make vaccination sustainable in the long term by reducing the scale of government campaigns to target the risky areas and times of year, while ensuring that vaccine is readily available for purchase by commercial farmers in between campaigns. Vaccination may be compulsory for high risk farmers wishing to sell birds. The aim is to reduce the level of state funding for vaccination, but it is acknowledged that public funding will continue to be needed for vaccinating small scale producers.

Engaging the private sector (from FAO 2006b)

There is a need to continue work with governments and their private sectors to fine-tune disease control strategies and promote forward planning.

- This has to start with identifying all the players, and engaging the private sector (input suppliers, traders, vaccine producers, processors) in country plans.
- Special attention is needed to include representatives of small-scale producers, who may be numerically very important.
- There is scope for enhancing North-South linkages between private sectors, for example through regional workshops and networks supported by international agencies. In particular mechanisms to strengthening private sector regulations which mitigate against disease spread should be examined.

Emerging issues

Illegal trade

Regional markets are interdependent in both formal and informal elements: it is clear that informal movement of birds cross borders is not only very hard to monitor but holds huge risks of disease transmission. This is an area where sensitive work with the different players in the marketing systems needs to be done to understand the risks and issues better.

Recovery

Outbreak control contingency plans seldom give sufficient thought to the recovery phase. Uncertainty over restocking disrupts livelihoods and can result in long term loss of market access for smallholders. All social systems have coping strategies but with uncertainty about option, limited possibilities for alternative livelihoods and/or limited access to credit, normal coping mechanisms and formal emergency support systems may not be adequate (see box 1 below on example from Egypt). However we have few concrete recommendations as yet to resolve this problem. An effort needs to be put into synthesising existing information on coping and recovery strategies and support mechanisms in order to build them into contingency plans.

Restocking is often mentioned as a possible alternative to cash compensation but it presents certain challenges, as illustrated by the experience of Viet Nam. Here, a scheme has been implemented in pilot districts (extract from [FAO/MARD, 2007](#)) with external funding, to benefit small scale farmers who suffered badly during outbreaks and were not compensated or poorly compensated in cash. 5400 households have been involved. Households to be restocked were formed into groups and required to attend training in poultry production and management. All of the restocked households chose to keep their new poultry in confined systems, although many had previously kept scavenging birds. Perhaps the most difficult feature of the project was the need to co-ordinate activities and build consensus at several levels of government and between many actors and professional disciplines, which delayed implementation for many months. It was also an enormous challenge to restock smallholders at a time when outbreaks were still occurring in the country and when the government was trying to implement measures to discourage smallholder poultry production.

Gender issues in HPAI control

The Vietnam workshop noted ([FAO/MARD, 2007](#)) that very little attention has been paid to gender issues when designing HPAI control strategies, either in Viet Nam or in many other countries. This is despite the fact that women constitute the vast majority of small-scale poultry keepers in most countries and have been often very hard hit by HPAI (box 2 for Egypt example). The discussion during the Vietnam workshop suggested two areas for attention.

- It is important that women, who are often the managers or owners of small poultry flocks, should directly receive communication messages and training. Information given to husbands and fathers may not be passed on.
- Restructuring measures have the potential to exclude women from poultry markets, if they require premises to be moved, zoned or significant investment to be made in upgrading of premises. Women often have limited access to land and credit.

In Vietnam the existence of the Women's Union in the majority of communities offers the potential to reach women poultry keepers, and to explore ways for them to participate in more biosecure poultry production. In many countries there are few or no organizations with the capacity to assist women livestock keepers.

Box 1. (extract from Geerlings, 2007) **A case studies of a poultry producer in Egypt.**

"Samira's" family is composed of three sons and three girls, five of them attend primary and preparatory schools and the youngest son is still under school age. Her husband is unemployed for health reasons. Samira (for privacy reasons a fictional name has been used) is the only breadwinner in the household. She can be considered belonging to a "very poor" wealth group, as defined by other community members. Samira trades poultry and rabbits for the people in her village. She collects the animals on her rounds through the village and sells these at different village markets six days a week. The villagers and Samira agree on the minimal amount that they would like to receive for their animals and any extra money above the minimum set price is hers to keep.

Because of avian flu Samira is heavily in-debt. Last year she borrowed EGP 350,- (\$63) from an NGO and invested that amount in poultry birds. Her small back yard poultry flock was composed of 32 chickens, 90 Pekin ducks, 16 Balady ducks and 2 turkeys. All these birds died of avian flu and she still has to repay the debt topped up with a high interest rate. Because business was so bad last year with hardly any birds to trade she had to get a second loan of 450 EGP (\$82) from another NGO to cover part of the interest of the first loan and to restock again. Her restocked flock composed of 11 Balady ducks, 9 Pekin ducks, 11 geese, 9 chicken, 3 turkeys, and 24 pigeons.

For the second time, her flock was infected and the birds died. Now she has three loans from different NGOs. The third loan amounted to 400 EGP (\$78) to cover part of the interest of the two loans and to buy a blanket for the winter season. Although the flock died she has an outstanding debt to pay to the NGOs. In order to be able to do that, she obtained a loan from a private moneylender with less interest and less paper work than the NGOs.

Samira's household can be considered an extremely vulnerable household; eight people depend entirely on Samira's income. Poultry is the main source of income and food. She is heavily in debt and cannot afford to take another risk. She stopped home production of poultry and kept trading in poultry. This is in spite of the restriction of poultry transportation between villages, not without risk because last year Samira almost got caught by the police for illegally transporting live birds. She was trying to get in a taxi with all her wooden cages with birds. The police saw her and chased her. Samira dropped her cages and run away, but in doing so she fell and seriously hurt her hip. She had to stay home for a couple of months. She couldn't earn any income in those months and depended on charity.

The food consumption of this family was relatively moderate and the AI adversely affected the consumption pattern. Poultry consumption was halved with almost no eggs. The overall consumption of poultry was drastically reduced. This family now depends more on the frozen sources of animal protein foods e.g. fish and meat because of their reasonable price.

Samira continues to trade poultry for the villagers and business slowly seems to pick up again. She says that this is the only thing she knows she can do well, and the villagers know her and trust her to do a good job.

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