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H1N1 Outbreak in Pakistan: Lessons Learnt



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Abstract

Compared to many other countries in Asia, the outbreak of pandemic influenza H1N1 appeared to be of minor concern to Pakistan. This paper analyses, using qualitative research methods, the extent to which such a notion was justified and the response of Pakistan's health system to the outbreak, exploring the degree to which it is responsive to problems posed by an emerging infection. It looks at the health system measures introduced prior to the H1N1 outbreak (after the implementation of the International Health Regulations 2005) as these came into play during this episode, as well as specific measures introduced subsequent to the H1N1 outbreak.

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Biography

Sania Nishtar is Founder and President of the think tank, Heartfile, a non-governmental organisation which today is a significant health policy voice in Pakistan and is recognised as a model for replication in other developing countries. Her areas of interests are health systems, global health, broader issues of governance and public-private relationships.

In Pakistan, her pioneering work in the health sector has inspired new initiatives and has shaped policies on health reform and non-communicable diseases. She is also the founder of Pakistan's Health Policy Forum and provides support to many agencies in an advisory role. In addition, she sits on many governing boards and is a visiting faculty member at many educational institutions. Within Pakistan, she is also a voice for change at the broader governance level as an op-ed columnist for Pakistan's largest English newspaper.

Internationally, Sania Nishtar's scope of work has several dimensions. She is a member of many expert working groups and task forces of the World Health Organization (WHO) and is currently a member of the board of the International Union for Health Promotion and the Alliance for Health Policy and Systems Research. She is also a member of the World Economic Forum's Global Agenda Council, the Clinton Global Initiative, the Ministerial Leadership Initiative for Global Health and many other international initiatives. She has formerly been on several international boards, and has chaired several global campaigns and programmes. Sania Nishtar has also been an advisor to WHO on numerous occasions, has published over 100 journal articles and is the author of six books. Her book on health reform entitled *Choked Pipes* was published by Oxford University Press in February 2010.

She speaks to audiences around the world and has been extensively published in and quoted in the media. Sania Nishtar is the recipient of Pakistan's Sitara-e-Imtiaz (presidential honour), the European Societies Population Science Award, 16 gold medals and many accolades from the International Biographical Centre, Cambridge, and the American Biographical Center. She holds a Fellowship of the Royal College of Physicians and a PhD from Kings College, London.

1. Background

In recent years the contemporary understanding of security within the context of a nation state has broadened from one centred on territorial sovereignty and therefore, military and political prowess, to one encompassing the holistic vision of 'human security' as defined by the United Nations.¹ According to the latter, 'security' encompasses other dimensions beyond state security, such as economic security, food security, environmental security, community security, personal security and health security.

Located in South Asia, Pakistan suffers from many internal as well as human security threats. It is the sixth most populous country in the world (165 million), 65 per cent of its population live in rural areas,² 46 per cent are illiterate³ and 36.9 per cent are below the age of 15.⁴ The importance of Pakistan's multidimensional security challenges with respect to water, food, energy, environment, demographic and health security have recently been highlighted.⁵

Health security has three dimensions, centred on epidemiological security, healthcare security and financial security.⁶ This paper focuses on one aspect of health security, that is, epidemiological security, which deals with threats from emerging and re-emerging infections. In particular, the focus would be on specific lessons from the recent H1N1 outbreak.

The novel H1N1 outbreak, which was initially known as swine flu and subsequently recognised as the 2009 pandemic influenza A/H1N1, emerged in Mexico in March 2009 and subsequently spread rapidly to many countries of the world. By November 2009 more than 622,482 cases and 13,554 deaths had been reported. Much earlier, in July 2009, the World Health Organization (WHO) had officially declared that the world was in the midst of a novel H1N1 influenza pandemic.

The first case of H1N1 was confirmed in Pakistan on 18 June 2009. All four initial cases detected were young and had a history of recent travel to the United States where they developed influenza-like illness (ILI). Initial recognition of cases was complicated as the clinical presentation was indistinguishable from the then ongoing seasonal dengue fever outbreak.⁷ Most of the cases of ILI during this time were self-limiting. In total there were 1,242 suspected cases of H1N1, of which 262 were confirmed laboratory cases. There were 29 deaths reported (15 males and 14 females) as a result of H1N1 in Pakistan. The geographical distribution of the cases is as follows: 30 per cent from Islamabad, 35 per cent from Punjab with the major cluster in Rawalpindi (close to Islamabad), 27.8 per cent from Sindh with the majority from Aga Khan Hospital in Karachi (private sector) and 5.4 per cent from Khyber Pakhtunkhwa (Peshawar) with two deaths transferred from Afghanistan.

2. Methodology

Qualitative research methods were used for this paper. These included a review of published and grey literature and informant interviews. Literature search involved a Pubmed and Medline search. The same search terms were used in Google. Grey literature included funding proposals, mission reports, internal planning documents of the Ministry of Health and the National Program for the Prevention and Control of Avian and Pandemic Influenza (National Program), and relevant documents of development partners. A dossier of all the media reports on the subject was also analysed. Six informant interviews were conducted with key stakeholders involved with the National Program, including the National Program

Manager and various staff members involved with field operations at different levels. Lessons learnt are summarised under the six domains of health system governance, financing, service delivery, health information systems, human resources and medicines.

3. Findings

3.1 Health governance

3.1.1 International Health Regulations, 2005

Until 2007, Pakistan had been complying with the International Health Regulations of 1969 (IHR 1969) which focused on cholera, plague and yellow fever. On 15 June 2007, the International Health Regulations, 2005 (IHR 2005), the world's first legally binding agreement on global health security, came into force. The revision was needed to address limitations of IHR 1969 with reference to new challenges related to control of emerging and re-emerging infections and cross-border travel, trade, communication and technology. There were many areas in which countries needed to make changes in order to comply with the stipulations of IHR 2005 (Panel 1).

Pakistan had some measures already in place to comply with IHR 1969. These included public health infrastructure for surveillance at airports, ports and ground crossings, and infectious disease surveillance. Subsequently, many regulatory measures were introduced under IHR 2005 and attempts were made to enhance emergency preparedness. Pakistan designated the focal point role stipulated by IHR 2005 to the National Institute of Health (NIH) in Islamabad. Many health system constraints stood in the way of effectively implementing IHR 2005. In addition, surveillance became a problem in Pakistan because several illnesses with similar initial manifestations (malaria, influenza, typhoid fever, hepatitis) are common in the country.

Panel 1: Strengthening response under International Health Regulations, 2005 – Key Areas

- Setting up early warning components of national surveillance.
- Setting up public health actions at points of entry.
- Nomination of international 'health focal points' and mandating them with the task of notifying of all events that may constitute public health emergencies of international concern and not just diseases.
- Augmenting diagnostic and technical human resource capabilities.
- Strengthening information collection and analysis functions.
- Setting up a functional laboratory system.
- Creating linkages between the International Health Regulations focal points and other institutional arrangements relevant to 'emergency response', including the World Health Organization's Global Alert and Response Network.

One of the key lessons from H1N1 relates to the realisation that the IHR 2005 signed by the Government of Pakistan is not yet functionalised. The estimated population of Pakistan is

around 165 million and the total number of laboratory confirmed cases is only 262, thus the approximate cumulative attack rate (AR) is 0.15/100,000. This statistical measure suggests that the impact of the H1N1 in Pakistan was the lowest in the world. However, it could also indicate that many cases had been missed or under-reported due to the absence of a well-established functioning countrywide surveillance system. The case fatality rate (CFR), at 11.1 per cent, was considered the highest in the world. This figure may have been the result of a huge under-estimation of detected/reported cases of A/H1N1.⁸ Such under-estimation could suggest that commitments under IHR 2005 have not been fulfilled.

3.1.2 Institutional mechanisms of the Ministry of Food, Agriculture and Livestock

Although poultry in Pakistan has been affected by H5, H7 and H9 strains of avian influenza virus (AIV) on a number of occasions since 1995, it was the outbreak of H7N3 in Sindh in 2004, with estimated economic losses of US\$20 million that led to concrete action in terms of the setting up of a Disease Surveillance Mechanism for Avian Influenza Control under the aegis of the Animal Husbandry Commissioner, Ministry of Food, Agriculture and Livestock of the Government of Pakistan. This initiative was supported by the Food and Agriculture Organization of the United Nations (FAO). The new initiative catered to the zoonotic side of the problem and dealt with bio-security and bio-safety standards in industrial scale poultry production. The Ministry of Food, Agriculture and Livestock established the National Reference Laboratory for Poultry Diseases to coordinate nationwide surveillance and provide diagnostic facilities in collaboration with the FAO and United States Agency for International Development (USAID).

This institutional infrastructure played a critical role in identifying a new AIV strain, H5N1, in the poultry belt of the North-West Frontier Province (now Khyber Pakhtunkhwa) in February 2006, and six weeks later in other parts of the country. Outbreak containment helped to reduce the highly pathogenic avian influenza. The outbreaks were stamped out by culling, movement control and strategic vaccination. Ever since its first identification in poultry in 2006, highly pathogenic avian influenza (HPAI) outbreaks especially those due to H5N1 virus have been occurring intermittently in Pakistan. In 2006 a total of 66 outbreaks were recorded in poultry whereas in 2007 disease occurrence increased to 70 outbreaks. In 2007 a case of human-to-human transmission of the virus was documented in the poultry belt of the North-West Frontier Province. The chain of transmission beginning with poultry-to-human transmission followed by probable human-to-human transmission was fortunately not sustained.⁹ The year 2008 was largely uneventful.

In February 2009, the World Animal Health Organization declared Pakistan free of avian influenza and the ban on import of poultry from Pakistan was lifted.

3.1.3 Institutional mechanisms of the Ministry of Health

The Ministry of Health of the Government of Pakistan established the National Program for the Prevention and Control of Avian and Pandemic Influenza in 2006 and allocated resources for the programme under its Public Sector Development Program (PSDP) the same year. Planning for the programme had commenced much earlier in 2005. The programme is based at the NIH of the Ministry of Health and deals with human aspects of disease security (Panel 2).

Panel 2: Main components of the National Program

- Emergency response.
- Clinical health services.
- Procurement and distribution of antiviral medicines.
- Vaccine procurement and distribution.*
- Containment and quarantine.
- Communication.
- Training and capacity building.
- Personal protective equipment.
- Influenza-like illness (ILI) surveillance in collaboration with Centers for Disease Control and Prevention (CDC), Atlanta, USA.

** money was not allocated to the project*

The National Program was modelled on the Ministry of Health's six other vertical disease control programmes. Under this arrangement, a programme is made responsible for technical planning, resource mobilisation from the donor community through liaison with the Economic Affairs Division of the Ministry of Finance, and developing norms and standards related to the new area in public health planning. The programme is also responsible for procuring medicines and vaccine and delivering them as well as providing provincial technical training. Provinces are responsible for delivering the programme to the districts. The delivery of the programme components is therefore critically dependent on the performance of the provincial and district health systems.

Although the programme was created and some financial resources were allocated, the programme was never adequately implemented and resourced. There was a provision for hiring virologists, infectious disease control specialists and surveillance officers and epidemiologists under the programme. However, with a change of government in 2008 and the resource constraints the same year due to the economic downturn, a nationwide moratorium on hiring was imposed. As a result, the process which had been initiated for hiring programme staff stalled.

Under the aegis of the Ministry of Health's National Program, an inter-sectoral steering committee was set up with representation from all sectors which have a bearing on prevention and control related efforts. The National Program is also represented on the National Public Health Board, a new institutional arrangement within the Ministry of Health where a few programmes of strategic significance are represented. This represents another level of intra-sectoral coordination. Furthermore, a National Task Force (which met on 12 August 2009 after the H1N1 outbreak) also exists. In terms of strategic planning, therefore, Pakistan has the advantage of having established the frameworks for strategic planning and institutional coordination. However, programmes are poorly resourced and a number of overarching factors and inherent institutional weaknesses act as an impediment to realising the commitments embodied in the plans.

The Ministry of Health's programme has a normative role. It is also mandated to coordinate with international agencies to tap sources of international support. The implementation functions are the responsibility of the departments of health of provincial governments, which

then liaise with Executive District Officers to deliver services at the district level. In terms of governance, therefore, there are several institutional hierarchies. One of the key observations during the H1N1 outbreak and previous outbreaks of pandemic influenza was the lack of coordination – both inter-sectoral and intra-sectoral – amongst these institutional arrangements, and the need to address this. Within just one province there are many duplicates of donor-supported structures, and therefore the chain of command, responsibilities and roles is not clear.

3.1.4 Evidence and policy

The implementation of the National Program of the Ministry of Health was yet another opportunity to highlight the evidence-policy disconnect in Pakistan and the pervasive nature of state capture and collusion in decision-making. Pakistan's resource constraints and the heavy reliance on external resources will be described later in this paper. Despite these resource constraints, money was mobilised from special channels outside of the National Program and spent on procuring thermal scanners, this despite the fact that the evidence supporting the use of thermal scanners for the purpose for which they were procured is very flimsy.

3.1.5 Overall governance and factors outside of the health sector

There are many determinants outside of the health sector which impede progress towards any programme target. Four factors are outlined here.

First is Pakistan's current energy crisis, which according to field observations is impacting the maintenance of the cold chain. Distribution of antiviral medication and vaccines was one of the major programme activities under the National Program. During transport of vaccines, ice-lined vans are used and hence the cold chain is maintained. However, there are no generators in the field and with long hours of electricity shutdowns – up to 12 hours in rural areas – occurring several days in a month due to energy shortage, refrigeration at first level care facilities (FLCFs) is bound to be affected. According to a recent survey of FLCFs, less than 8–13 per cent of health facilities being run under various management models in Pakistan have a functioning generator.¹⁰ Maintenance of the cold chain is therefore certainly impacted.

Second, existing issues are compounded by the ongoing war in the northeastern areas of Pakistan, the internal security situation and misunderstood religious teachings. The determinants of the failure to achieve polio eradication in Pakistan can be used to illustrate the magnitude of the problem; they are equally relevant to any effort aimed at control of emerging and re-emerging infections, and in particular pandemic influenza.

Pakistan is one of the four countries in the world where polio has not to date been eradicated. In many ways this demonstrates the importance of determinants outside of the health sector in influencing health status. Failure to achieve relatively straightforward targets such as immunisation with comparatively well-resourced initiatives such as Pakistan's Expanded Programme on Immunization (EPI) and polio control are evidence, not only of the seriously eroded capacity of the state to deliver services, but also many other factors. An excerpt from a recent publication summarises the problem:

Issues of access in a war and conflict ridden zone, refusal on part of parents to vaccinate their children and problems with cross border movement of nomadic populations from Afghanistan are foremost in this regard. 12 per cent of Pakistan's territory in the Federally Administrated Tribal Areas (FATA) is currently in the grip of a conflict where Pakistan's Armed Forces are fighting an armed insurgency. Here organized factions challenge the writ of the state making it effectively impossible to deliver services to war ridden populations that have fallen prey to humanitarian crises in many pockets. Talibanization and the unfortunate misconstrued interpretation of religion has led more than 90 per cent of the clergy in conflict ridden zones to campaign against polio vaccination on a wide scale, effectively orchestrating refusal by parents to vaccinate children on the mistaken grounds that vaccination is Haram or forbidden by the religion. With the spreading wave of talibanization outside of Pakistan's specially administered areas to areas in the direct control of the state and the indoctrination of their philosophy into innocent illiterate masses, exploitable in the name of religion, the likelihood that this unfortunate notion will spread elsewhere in the country has increased.¹¹

Responses from the field indicate that there are serious access issues in 12 per cent of Pakistan's territory in the Federally Administered Tribal Areas. Therefore, it is not clear if the delivery of vaccine and medicines to these districts was actually achieved.

Third, Pakistan's overarching institutional arrangements of governance are in flux, with many changes being introduced which are altering the equation of responsibility in terms of federal-provincial-district roles with the result that the hierarchy of responsibilities is being blurred. The crisis of governance seems to have worsened at a time when a firm grip on governance is critically needed. Many competing priorities on the internal security and economic fronts and short-term issues are crowding out the space for longer term substantive changes needed in the interest of institutional strengthening. These overarching factors do not augur well for the social sectors. Health in particular is a neglected area, with its crumbling system which is finding it very difficult to step up to the security responsibility that disease brings in its wake, despite the existence of plans in black and white. The first priority is to strengthen and consolidate existing institutional arrangements and clearly define roles and responsibilities to overcome the current fragmentation and constraints. These problems are not within the remit of disease security, but need to be addressed if disease security plans are to be implemented effectively.

One of the problems that need to be resolved at the earliest is clarity with reference to roles at the federal-provincial-district interface. Previously, policymaking was the prerogative of the Federal Ministry of Health. However after the recent 18th Amendment to the Constitution of Pakistan and reorganisation of fiscal federalism – under the National Finance Commission Award 2010 – provinces have been fully mandated with respect to the health sector. In fact, there is a constitutional stipulation that the role of the Ministry of Health should be scaled back within the next year to play down the federal role in the health sector (and 13 other sectors). This reorganisation is the subject of ongoing debate and a bone of contention. It poses a problem to the health sector in a number of areas, including efforts to institutionalise disease security. Many institutions will pass on their responsibilities to the provincial domain and the impact that this would have on several aspects of disease security will have to be ascertained. The NIH and the National Program for the Prevention and Control of Avian and Pandemic Influenza are currently under federal jurisdiction. Their relationship with the

provinces will have to be revisited in view of the reorganisation that the latter might have to undergo.

Similarly, provincial-district relationships are also in flux. After a protracted battle, provincial governments finally have the prerogative to dismantle a federally implemented local government system installed by a military government in 2001. The ensuing change, which may be different in each of Pakistan's five provinces, will have a number of implications for local governance, such as in the handling of data and information, which is a critical element of disease security.

The key lesson here is that institutional entities which have strong organisation at the governance level can create an impact when they are adequately resourced, when the institutional structure to implement them is functioning effectively and when evidence is heeded.

3.2 Financing

Financial resources were critical in initiating action in the wake of the H1N1 outbreak and the earlier outbreaks of pandemic influenza. Alongside institutional arrangements, the government of Pakistan was quick to allocate resources for this purpose. However the translation of allocation into disbursements was inefficient as illustrated in Table 1. Utilisation issues remained pervasive – only a fraction of the total project cost of the National Program for the Prevention and Control of Avian and Pandemic Influenza was funded through revenue allocations. Of the total project cost of Pakistan rupees (Pak. Rs.) 2,300 million to date, only Pak. Rs. 56.5 million was from public sector expenditure. The balance of the cost was funded through donor allocations.

Development projects above the financial ceiling of Pak. Rs. 40 million are subject to a system of departmental approval through the Planning Commission of Pakistan. Projects below that level are approved by the Ministry of Health. The total cost of the National Program was projected to be Pak. Rs. 330 million over a five-year period. However over a four-year duration from the approval of the project in 2006, only Pak. Rs. 56.5 million (32 per cent of the amount allocated) were disbursed to this project from PSDP budgets.

The total cost of the project was also grossly underestimated. According to the programme manager, Pak. Rs. 2,300 million (taking into account in-kind contributions) has been spent on the project to date. PSDP expenditure (indigenous revenue allocations) for this project amounted to only 2.52 per cent of the total project cost to date. When the project was initially conceptualised, official development assistance was not requested. However, despite that, in-kind contributions were made by multilateral and bilateral development agencies. There was no money allocated from the government's disaster management framework, which is relatively well funded and also has procedural provisions which allow tapping into resources and bypassing the conventional, lengthy procedures.

Table 1: Yearly allocations and expenditures for the National Program for the Prevention and Control of Avian and Pandemic Influenza, in million Pakistan rupees.¹²

Serial #	Year	PSDP* Provision	Actual Amount	Actual Expenditure	Per cent Utilised of Released Amount
1	2006–7	50	50	5.08	10
2	2007–8	100	100	30.4	20
3	2008–9	45	8.03	7.8	98
4	2009–10	45	17.7	12.9	74
Total		240	175.7	56.5	32

* Public Sector Development Program

A review of financing shows that Pakistan does not have the fiscal space to support programmes that may need to be launched or scaled up in emergency situations. The heavy reliance of the National Program on donor contributions makes it highly unsustainable and vulnerable in the future. Sustainable channels should be earmarked for funding emergency activities in the future so that the heavy reliance on donor resources for critical initiatives is obviated.

3.3 Medicines, equipment and vaccines

In the wake of the H1N1 outbreak there was a need to stockpile antiviral medicine (Oseltamivir/Tamiflu) and vaccine. Whilst there was provision in the National Program structure to procure medicines, there was none to procure vaccine.

The H1N1 outbreak was a time of great demand for vaccine especially in view of constrained global production capacity. The vaccine was not manufactured in Pakistan and needed to be imported or donated. Despite these constraints, Pakistan was able to obtain a sizable donation from two sources.

China donated 0.5 million doses and the WHO supplied a much larger USAID-funded donation of 3.1 million doses of vaccine in 2009.¹³ The latter was supported by ancillaries, such as auto-disable syringes and safety boxes. Resources were also allocated by USAID for logistic arrangements to support deployment. The National Program Manager of the National Program for the Prevention and Control of Avian and Pandemic Influenza crafted a deployment plan in consultation with stakeholders from the EPI. The plan was evaluated and costed by the donor agency, which also bore all the deployment and logistics costs using a reimbursement-based mode. The National Program Manager's impression is that the total need based on estimates of doses of vaccines required was met through this package of assistance; however other respondents disagreed with this notion. According to the guidelines, only high-risk groups were supposed to be identified and vaccinated. These included healthcare providers, pregnant women, immunocompromised patients, patients having chronic obstructive pulmonary disease and cardiovascular disease, diabetes, obesity and chronic diseases, and aircraft cabin crew. The stockpile was distributed to the provinces and then onwards to the district delivery outlets. Beyond the district delivery level, the

Executive District Officers responsible for health were responsible for the delivery of the medicines and vaccine. It is not known clearly to what extent that objective was achieved.

According to several respondents USAID's attempts to inject transparency into the system were met with resistance. The donor did not make resources available for bulk procurement of medicines, but procured medicines itself instead and made them available to the programme for delivery. There is a general impression that collusion in procurement of medicines is pervasive in Pakistan's public health system. Respondents were of the impression that when provincial and district functionaries lost the opportunity to pad procurements with 'incentives', they lost interest in the programme and viewed work related to projects as an additional chore. It was strongly felt by the respondents that functionaries did not take ownership of or engage with USAID's project for this very reason. USAID also packaged incentives for every person in the supply chain to deliver consignments to their destination. It was reported that there was graft at this level as well, as travel invoices were forged and there was deliberate inattention to oversight to compel accountability. This pattern of graft and pilferage from health projects in the field is identical to what has been described for other national public health programmes which have implementation arms in the field.¹⁴

The National Program was able to stockpile 200,000 complete treatments of Tamiflu. The WHO provided medicines worth Pak. Rs. 350 million. Tamiflu is manufactured by more than half a dozen local manufacturers; however, the National Program did not use its funds for the procurement of medicines as the need was met through the WHO donation. The drug was meant to be distributed to provinces/districts on the basis of priority criteria. These are enumerated in Panel 3. The Federal Unit of the National Influenza Control Program was meant to be responsible for monitoring drug distribution and ensuring judicious use of medicines.

Panel 3: Priority criteria for distributing drugs (excerpt from a Ministry of Health brief)¹⁵

1. Cities having international linkages, e.g., international airports, seaports, etc.
2. Cities having borders with neighbouring countries and entry routes by land.
3. Cities with dense population and having frequent foreign visitors from other countries.
4. Limited amounts at airports, seaports and land routes.
5. Sentinel hospitals already earmarked for avian influenza.

It could not be ascertained if the drug registration process of Tamiflu was fast-tracked. The process of procurement of medicines and their delivery, which was one of the major components of the project, was fraught with the same supply chain challenges as the ones described for vaccines. The risk that excessive public awareness of the process would result in an adverse reaction from certain communities as, for example, in the case of polio where refusals were orchestrated by religious groups thereby undermining acceptability of medication, was also a consideration.

The key lesson in this is that the pervasive pattern of graft in the field delivery of services in the health sector gears the system for pilferage. Therefore, any attempt to deliver more services through this system may be subject to that fate.

3.4 Human resources

Capacity building was another of the key programme areas of the National Program. Since 2006, more than 1,000 master trainers have been trained through workshops in the provinces.¹⁶ There is no information on how the training cascaded from this group.

3.5 Service delivery

The capacity to achieve the goals of epidemiological/disease security is closely interlinked with broader health system capacities and constraints. In Pakistan's mixed health system, the triad of insufficient funding for the public sector, a poorly regulated private sector and lack of transparency in governance act together to compromise the quality of public services and defeat the equity objective through a number of mechanisms.¹⁷

A specific pattern of malpractice in the field delivery of services is endemic in the national public health programmes of the Ministry of Health. This can be described as follows:

Institutionalized malpractices at the field level, gear the system towards pilfering resources. Collusion between service delivery staff and supervisors fosters deliberate inattention to staff misconduct. As a result, staff remain absent from duty, do not run field operations, and siphon material resources for use in private facilities. Service delivery is, therefore, undermined both qualitatively and quantitatively and charges are levied for services that are meant to be provided free of cost.¹⁸

The source cited above described malpractices in every field programme: in the population control programme, contraceptives are pilfered and are used in private facilities or they are wasted to meet programme targets. In the malaria control programme, insecticides meant to be distributed free of charge are sold in the market and the spray equipment put to private use. In the vaccination programme, vaccinators engage in petty theft by charging for vaccination cards and syringes that are disseminated to them free and/or by selling part of the vaccine stock to private hospitals. Similarly, the Tuberculosis Direct Observed Treatment Short course (TB-DOTS) programme is abused by forging monitoring visits to draw travel allowances. Observations from the field, which were part of this analysis, showed that similar malpractices in the field delivery of services plagued the operations of the National Program for avian influenza, the result of which vaccine and medicines were being pilfered. A lot of the stock was also wasted as field functionaries have no 'incentive' to deploy them. These pervasive service delivery problems significantly constrain the ability of the system to achieve programme objectives.

Observations of corruption in this analysis are consistent with information from several other sources. Evidence of corruption at an institutional governance level in Pakistan comes from comparative country rankings,¹⁹ international case studies²⁰ as well as studies conducted in Pakistan.²¹ In a cross sectional survey, 100 per cent of the respondents reported having encountered corruption while attempting to access one of the seven basic services in Pakistan.²² Issues of management and governance have been identified as one of the key impediments to leveraging the potential within Pakistan's extensive health infrastructure;²³ these constraints have an important bearing, not only on Pakistan's current health indicators, which significantly lag behind international targets, but also on efforts to achieve disease security.²⁴

3.6 Information systems

Domestic information systems within the health sector comprise many arrangements. Over the years, investments have been made in several health information systems. These include a vital statistics sample surveillance system,²⁵ the Health Management and Information System (HMIS),²⁶ and several vertical infectious disease surveillance systems such as the Lady Health Worker Management Information System (LHW MIS) and the Expanded Programme on Immunization Management Information System (EPI MIS) as well as a range of periodic surveys.²⁷ A number of infectious disease information systems are relevant to disease security (Table 2).

Table 2: Infectious disease surveillance systems

Name	Set-up	Frequency of reporting
EPI	Vertical	Monthly
AFP/Polio (+ measles, tetanus)	Vertical	Immediate
Malaria	Vertical	Monthly
HIV/AIDS	Vertical	Quarterly
TB-DOTS	Vertical	Quarterly
DEWS	Decentralised	Immediate/weekly
HMIS	Decentralised	Monthly

EPI	Expanded Programme on Immunization
AFP	Acute Flaccid Paralysis
HIV/ AIDS	Human Immunodeficiency Virus / Acquired Immune Deficiency Syndrome
TB-DOTS	Tuberculosis Direct Observed Treatment Short course
DEWS	Disease Early Warning System
HMIS	Health Management and Information System

Note: Information in this table is adapted from a presentation by Dr Khalif Bile Mohammad, WHO Representative in Pakistan, during a pre-assessment workshop.²⁸

3.6.1 Absence of an integrated communicable diseases surveillance system

Several infectious disease surveillance systems exist within individual disease-specific programmes in Pakistan, as shown in Table 2. However, Pakistan does not have an integrated surveillance system with the capability to forecast and respond. Forecasting and responding to pandemic influenza A/H1N1 or any other influenza viruses is therefore a major problem in Pakistan. A national integrated communicable disease surveillance system is considered a required core capacity to properly operationalise the IHR.

The AFP(Acute Flaccid Paralysis)/Polio Surveillance System in particular taps all possible sources of information through active surveillance methods and picks up nearly every case of polio – it is recognised as being highly sensitive. This is an active surveillance system where each case is rigorously sought out in the community. As such, it can only be used for diseases marked for elimination or in outbreak and emergency situations. However, many of

the attributes of the system, including active surveillance visits at health facilities, laboratory specimen collection, transport and laboratory testing, channels of data reporting, analysis and dissemination, use of indicators to measure surveillance quality, training and capacity building of staff, etc., are also attributes of other surveillance systems. These attributes are of relevance to building capacity in the wake of the threat posed by emerging and re-emerging infections. However, the potential within the approach to consolidate infectious disease surveillance has not been fully harnessed in Pakistan.

Other currently existing channels of infectious disease surveillance – HMIS, LHW MIS and EPI MIS – have many gaps and remain fragmented. Therefore, effectively, Pakistan does not have a reliable infectious disease surveillance system in place. By and large, there is minimal coordination between programmes. Also, most of them usually do not tap into all sectors, therefore their data provide an incomplete picture, particularly with reference to the private sector. In addition, these systems have limited capacity to confirm clinically diagnosed cases of reportable diseases because of gaps in the public health laboratory network within the country. This is compounded by an absence of legal requirements to report notifiable diseases.

A number of efforts have been made in the past to strategically analyse weaknesses and propose solutions to bridge existing gaps. A World Bank-led multi-stakeholder assessment of Pakistan's public health surveillance system conducted in 2004 made a number of valid recommendations, which are relevant even today. These called for the development of a legal system to mandate notification of priority diseases, the regulation of laboratory practice and the integration of piecemeal surveillance activities into a comprehensive public health surveillance system consisting of peripheral data collection arms linked to a central system.²⁹ Similarly, through the collaborative efforts of the Pakistan Medical Research Council and the NIH, an Infectious Disease Surveillance Plan was developed in 2004.³⁰ These efforts need to be built upon further with attention to capacity enhancement as a priority. The Field Epidemiology and Laboratory Training Programme (FELTP) established at the NIH in collaboration with the Centers for Disease Control and Prevention (CDC), USA, is an important step in strengthening surveillance capacity.³¹ This programme can provide epidemiological leadership to guide many surveillance systems that are currently operating independently in the country.

Similarly, the Disease Early Warning System (DEWS) was established in 2001 in Pakistan, a joint effort by the Ministry of Health and the WHO with technical support from Johns Hopkins University, with the overall objective of expeditiously detecting and responding to any potential risk of outbreaks caused by selected communicable diseases. This system has been established and is functioning in all areas (districts) which have historically been affected by environmental disasters (earthquakes and floods) or conflicts which have previously resulted in humanitarian crises. However, the system has limited coverage – even in targeted areas (districts), the horizontal coverage from the available, functioning health facilities ranges between 40 and 90 per cent. In addition as data collection focuses only on morbidity, there is no clear follow-up tracking system. These limitations notwithstanding, the system has value for Pakistan's resource-constrained setting; however, its utilisation has not been maximised. Lessons from the DEWS experience need to be taken into account whilst establishing or strengthening other sustainable surveillance systems.³²

At the height of the H1N1 outbreak the WHO Pakistan office regarded the establishment of an influenza sentinel surveillance system representative of the geographic and demographic make-up a top priority for public health planning in Pakistan. They were of the opinion that such a system would help decision-makers identify effective response strategies over the course of the pandemic, enable them to re-evaluate recommended priority groups for vaccination and antiviral therapy, and facilitate efforts to mathematically model the spread of disease during a pandemic.

3.6.2 The Health Management and Information System (HMIS)

The HMIS collects data from FLCFs and reports these data to the district level on a monthly basis. The system has been functional since 2000 but suffers from many limitations as a result of its limited scope and issues of connectivity. After devolution of government and decentralisation of decision-making and resource management authority in 2001, efforts were made to improve the HMIS and integrate it with other information systems in the country such as the LHW MIS and EPI MIS. Based on the results of a study conducted by the Japan International Cooperation Agency (JICA), a District Health Management Information System (DHIS) was designed and is currently being implemented in four districts.³³

The DHIS differs from the HMIS in many ways, notably in the selection of indicators and in being more comprehensive as it also captures data from secondary care public hospitals. However, DHIS needs to be expanded further to include public sector tertiary care teaching hospitals, which are currently outside of its realm. Some of these hospitals have already established their own hospital information systems which can be made interoperable with DHIS. Future efforts aimed at expanding the scope of facility-based surveillance in general and DHIS in particular should also explore the possibility of collecting data from private healthcare facilities on a sustainable basis. Currently, there is no way of gathering data from these sites. Establishment of a sustainable data collection system in private sector healthcare facilities is linked to the broader issue of regulating the private sector – an institutional change outside of the remit of the health information system. It appears feasible, however, to bridge this specific information gap through periodic surveys of private facilities and the introduction of a web-based electronic reporting system for a core set of indicators.

3.6.3 Application of technology in health information systems

One of the most useful applications of technology in the health sector is in the area of health information systems. By and large Pakistan's facility-based and field level data collection systems do not make optimal use of technology. The HMIS, which collects data from over 6,000 FLCFs, is paper based.

Here gaps at the resource and capacity levels exist and ambiguities about line reporting (provincial-federal vis-à-vis district-federal) were noticed in the wake of recent avian flu and dengue outbreaks. Information collection and analysis functions exist at various levels. Within the realm of provincial/district control, District Health Officers (DHOs) are responsible for locally collating and analysing information, but there are serious gaps at the district level in this respect. This information is in turn relayed to the central HMIS, which is in under the Ministry of Health, for analysis and action. However, despite the existence of an elaborate infrastructure to collect information, simple easy to bridge gaps still abound. For example, there is currently more than a three-month delay before information from the districts

reaches the central HMIS level which is where the analytical capability exists. This gap can be bridged cost-effectively through the appropriate use of technology. Addressing these challenges at the resource, capacity, line responsibility and reporting levels are central to developing a response capability to emerging and re-emerging infections.

Data transmission from source to the central system takes a long time. Each district has a facility with a single computer where data from various sources are aggregated and keyed into a computer. The flow of data from the districts to the centre is not done uniformly. In some cases, it is sent as an email attachment to the respective province, whereas in other cases, removable media are used. Data would then be aggregated at the provincial level from where it is sent to the central HMIS, again mostly through removable media. A pilot project was previously initiated in four districts to automate the process of data collection and transmission. The outcome of the pilot and plans of scalability, if any, are not available in the public domain. With the availability of mobile devices, barcode readers, radio frequency identification (RFID) technology and broadband networks, innovative solutions for keeping data current at source, transmitting data to a central location, and collating and aggregating data within the HMIS need to be explored and appropriate actions prioritised.

The HMIS is currently confined to FLCFs. As mentioned earlier, the DHIS, a pilot designed to be an improvement on the HMIS, additionally encompasses secondary level facilities but is currently limited to four districts.³⁴ By and large therefore, public hospitals are outside the remit of the HMIS and DHIS. Although e-solutions have been mainstreamed in some well-resourced settings, notably in the Fauji Foundation System and the Armed Forces health system, and hospital information systems have been deployed in some federal government hospitals, they remain isolated islands and have not been integrated with the national HMIS. At the district and *tehsil* (a local government entity similar to a county) levels, some initiatives have been undertaken through donor-funded projects but these are a long way from having any substantial impact. A few high-end private sector hospitals have made use of information technology in patient care as well as in their administration and billing system. However, in most cases, smaller public facilities and ambulatory clinics in the private sector do not tend to invest in technology.

The current trend, both in the private as well as public sectors, is to develop custom HMIS applications supported by a dedicated team of IT professionals. This model is not feasible for large-scale deployment for two reasons. First, the cost of initial hardware and software would be very high, and second, ongoing operations would require dedicated IT staff. Therefore, an alternative model has been recommended for district hospitals.³⁵ Since all district hospitals follow the same business processes, at least within a given province, there is no reason to have a custom solution developed at each location. Furthermore, given the availability of broadband service in most districts, district hospitals could link to a central computing facility rather than having their own IT infrastructure. This would provide significant economies of scale and reduce operational complexity. The software application should be developed centrally, allowing access by all participating hospitals – with each having its own data set. Pakistan has an excellent telecommunications infrastructure. As broadband service further extends to smaller towns, Basic Health Units (BHUs) could also be connected to a central computing facility in a similar manner. As district hospitals and BHUs get connected to the central facility, the infrastructure can be used for several other applications besides providing MIS services to hospitals. The Ministry of Health must make critically needed investments in this area.

3.6.4 Overarching issues in information systems

Although Pakistan has many health information systems-related institutional arrangements, there is no apex agency to systematically collect, consolidate, analyse and interpret information, and relay it in a timely manner for mainstreaming into the decision-making process. Previously, the National Health Information Resource Centre was meant to collate information whereas the National Health Policy Unit was mandated to perform the analytical role. In reality, both were poorly resourced and lacked the capacity to perform these functions.^{36,37}

The Ministry of Health should, therefore, mandate an agency to take overall responsibility, one that it should work closely with. However, the agency should have some degree of independence – an attribute deemed necessary by the WHO. In 2006, Heartfile led a process in collaboration with the Federal Bureau of Statistics to develop a system for collating health information on a yearly basis and developed the first template on which this was to be done.³⁸ The document in which this was compiled also underscored the need for an apex agency, and outlined all the functions such an agency could play. In particular, there was a call to strengthen the institutional pillars of the national health information system, to develop a sound policy and system for ensuring ethical conduct in the data system, and to bridge gaps among individual information systems. It was outlined that the agency should also enable the consolidation of ad hoc, overlapping or stand-alone data systems and coordinate donor-driven data activities to ensure that national health information priorities are met and national systems are strengthened. The plan also underscored the salience of building linkages with appropriate data sources outside of the health sector, thus ensuring regular flow of data from all relevant sources.

3.6.5 Viral sovereignty

Since Pakistan does not press the issue of ‘viral sovereignty’ as is the case with some countries in Asia, and does not subordinate global health interests to the notions of sovereignty, data sharing and international collaboration are not major issues.

4. Disaster management arrangements

Pakistan has many institutional arrangements responsible for disease security and emergency preparedness. The role of a National Program within the NIH and the Ministry of Food, Agriculture and Livestock has already been referred to. There are, in addition, several DEWS units at the federal and provincial levels. The state also has many other incident management and disaster management institutions, including the National Disaster Management Authority, Provincial Disaster Management Authorities, and national and provincial rehabilitation authorities. In the aftermath of the October 2005 earthquake, many other rehabilitation agencies were also created. However, despite these investments, there is much fragmentation and duplication.

The most suitable way of approaching this issue would be to create a dedicated institution responsible for incident management as a public health programme priority. This could be configured for emergency response within a broader context as opposed to being an ad hoc mechanism for emerging and re-emerging infections. Pakistan is a seismically active zone, with the devastating October 2005 earthquake being a case in point. The Indus basin is also prone to frequent flooding, causing thousands to be displaced almost every year. The threat

of biological warfare and intentional release of infectious agents looms with the pervasiveness of terrorism in the country. These challenges necessitate the creation of a Health Incident Management System in Pakistan – a system which incorporates disaster planning with a focus on preparedness, response and recovery. Such an institutional entity should foster collective responsibility in responding to complex and unique emergencies – natural or manmade.

Such an agency would have unique tasks even out of the ‘implementation’ mode. For example, it can develop protocols for different phases of operations in disasters as well as procedures for seeking assistance, locally and internationally. It can also develop mechanisms for ensuring pharmaceutical supply flows and identify potential sources. It can also map health sector infrastructure and human resource. The agency can also plan for hazardous waste disposal, take inventory of public health demands, develop plans for the provision of needed medical equipment and supplies, and identify potential sources of such supplies. Moreover the agency can ensure capacity building of Communicable Disease Control Officers and Sanitary Patrol Officers on an ongoing basis.

A Health Incident Management System would also have to strengthen its collaborations with international channels of support. The WHO has created a Global Alert and Response Network to assist in the implementation of the IHR 2005. This is a technical collaboration of existing institutions and networks coordinated by the WHO. The network can pull technical and human resources for the rapid identification and confirmation of, and response to, outbreaks of international importance. For countries such as Pakistan with limited capacity, it would be important to create active linkages with this initiative and to assess how this resource can be tapped into. The need to develop indigenous capacity to deal with complex and unique emergencies – natural or manmade – should not be underestimated. Lessons from the October 2005 earthquake tragedy have important relevance in this regard. In the aftermath of the earthquake, Pakistan received considerable international assistance. However it must be appreciated that during pandemics, other countries are also likely to experience emergency conditions, and therefore, opportunities for inter-country assistance such as those seen during the October 2005 earthquake or during local disease outbreaks may be curtailed. This is precisely why reliance on indigenous capacity is a prerequisite, and a consolidated Health Incident Management System a priority.

5. Conclusion

The analysis presented in this paper reveals that Pakistan has in place many institutional mechanisms related to the prevention and control of pandemic influenza. However, these are plagued with fragmentation, duplication and resource constraints. The country does not have any constraints as far as developing plans and signing international commitments are concerned. However the possibly considerable under-detection of cases of H1N1 indicate that commitments under IHR 2005 have not been fulfilled. Therefore the impression that, compared to many other countries in Asia, the outbreak was of comparatively minor concern to Pakistan, was misplaced; many cases had been missed or under-reported due to the absence of a well-established functioning countrywide surveillance system. The analysis also reveals that Pakistan does not have the fiscal space to support programmes that may need to be launched or scaled up in emergency situations. The heavy reliance of the National Program on donor contributions makes it highly unsustainable and vulnerable in the future.

Poor performance of the country's health system and abysmal quality of governance are the foremost factors standing in the way of ensuring disease security. The pervasive pattern of graft in the field delivery of services was a consistent observation in relation to delivery of vaccine and medicines in the wake of the H1N1 outbreak. In addition, factors related to security, law and order and energy security also impact field operations. In the event of another outbreak Pakistan will be particularly vulnerable due to its many systemic constraints.

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