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From the field side of the binoculars: a different view on global public health surveillance

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It is generally assumed by the donor community that the targeted funding of global, regional or cross-border surveillance programmes is an efficient way to support resource-poor countries in developing their own national public health surveillance infrastructure, to encourage national authorities to share outbreak intelligence, and ultimately to ensure compliance of World Health Organization (WHO) Member States with the revised (2005) International Health Regulations. At country level, a number of factors and constraints appear to contradict this view. Global or regional surveillance initiatives, including syndromic surveillance and rumour surveillance projects, have been conceived in neglect of fragile health systems, from which they extract scarce human resources. In contradiction with a rightful stance promoting 'integrated surveillance' by WHO, the nurturing of donor-driven, poorly coordinated and redundant surveillance networks generally adds further fragmentation to national health priorities set up by developing countries. In their current categorical format, ignoring the overwhelming deficits in governance and health care capacity, global surveillance strategies seem bound to benefit mainly the most industrially developed nations through the provision of early warning information or scientific data. In lower-income countries, a focus of resources on strengthening the health system first would ultimately be a more efficient way to achieve proper detection and response to outbreaks at national or sub-national level. As documented in several pilot initiatives at sub-national level (India, South Africa, Tuvalu and Cambodia), the empowerment of frontline health workers and communities is a key element for an efficient surveillance system. Such simple measures centred on human resources and community values appear to be more beneficial than massive and conditional monetary inputs.

Keywords World Health Organization, public health surveillance, developing countries, Laos, health care systems, national health policy, communicable disease control

KEY MESSAGES

- In developing countries, the multiplication of supra-national public health surveillance initiatives reflects a focus on the exclusive interests and priorities of donor countries or institutions.
- At country level, the global public health surveillance agenda runs the risk of being translated into new categorical programmes ignoring deficits in health systems and local public health priorities.

Introduction

The revision of the International Health Regulations (IHR) adopted in 2005 by the 58th World Health Assembly (WHO 2005a) commits World Health Organization (WHO) Member States to collaborate with international organizations in implementing adequate preventive and reactive measures against the international spread of disease while avoiding 'unnecessary interference with international traffic and trade'.

Referring to part A of its first Annex, the revised IHR(2005) practically instruct governments on how to participate in an international network of surveillance networks, through

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reviewing their current surveillance strategies and through the implementation of sound programmes capable of contributing to global outbreak intelligence.

With a sense of opportunity, prominent members of the donor community have expressed their economic and social concerns about outbreaks of international importance. Through different bilateral or regional initiatives funding surveillance programmes on emerging diseases, major donors have pledged to help developing countries meet requirements indicated by the revised IHR(2005). With the proper international regulations in place and adequate external technical expertise at hand, it would just take additional grants or loans to see developing countries reach reasonable standards of surveillance for outbreak-prone diseases. At least, this is the simple logic entertained by investors in health programmes to justify substantial monetary inputs into Ministries of Health under recent surveillance initiatives.

At odds with such views, I argue that the targeted funding of new surveillance programmes will not significantly help developing countries improve their own capacity for outbreak detection and response. At this advanced stage in the development of global surveillance, the bottleneck issues are neither technical nor financial. A number of equally influential factors have not been addressed—at least not explicitly—in expert committees surrounding the preparation of the revised IHR. Broadly categorized, these factors relate to: (1) determinants of political commitment from Member States, and (2) health systems, including governance and human resources. The former category encompasses external influences and perceptions surrounding the global surveillance agenda; these are analysed in a related paper (Calain 2007). The latter factors, which represent national capacities, are addressed in this article and illustrated by a few examples from developing countries. The conceptual framework drawn in Figure 1 synthesizes both topics. It shows how perceptions and concerns of national actors can interfere with the flow of information for global public health surveillance, among an intricate canvass of external influences and interests.

Country capacities: more than money matters

Regardless of international regulations, governments will set up their own thresholds for reporting, according to a balance between perceived threats to their sovereignty and offered benefits in terms of assistance. Likewise, regardless of any regulation or enforcement mechanism, designated or voluntary providers of health information will, consciously or not, adjust their reporting performance after exercising judgement on: usefulness, acceptability, benefits (personal or to the community) or costs (drawn from limited budgets or in terms of time burden). These categories should capture the scope of perceptions by front-line health workers toward surveillance systems; they partly overlap with monitoring and evaluation indicators for surveillance defined initially by Thacker *et al*. (1988) and updated recently by the WHO (2004a). However, the WHO indicators address mostly technical, logistic and monetary inputs (the so called 'core' and 'support' functions of surveillance). Such inputs have no fundamental effect on perceptions of a surveillance system. Mirroring the interplay between international organizations and Member States, perceptions between Ministries of Health and health care providers can only be improved through ongoing processes reflecting political commitment and improvements in governance.

It is generally assumed that all communicable disease surveillance systems set up in industrialized countries perform optimally, but evidence is lacking. Systematic assessments of surveillance systems by external evaluators have targeted mainly developing or transitional countries, leaving some questions open as to what is the standard 'reference' performance in public health surveillance. A few surveys of physicians' attitudes toward mandatory reporting of infectious diseases have been carried in industrialized countries since the late 1980s (Harvey 1991; Krause *et al*. 2005). They show that doctors' knowledge and compliance with notification systems is low, even in countries with well-funded health systems.

In developing countries, possible reasons for the resistance of front-line health professionals to implementing surveillance systems include: (1) a sense of redundancy and overlap between different uncoordinated surveillance programmes; (2) the frequent confusion between collection of data for planning/management or for rapid outbreak response; (3) the high burden of extra administrative duties; and (4) the lack of meaningful reward. In Germany (Krause *et al*. 2005), lack of feedback of consolidated surveillance data to the reporting physician was found to be a critical issue limiting compliance with reporting. In developing countries, health workers' expectations of central health authorities are more pragmatic than the mere feedback of information. What they expect, too often in vain, in return for their compliance with reporting requirements are: easy access to laboratory facilities (which are unavailable locally in most of the cases), provision of critically needed drugs and supplies, and extra workforce for patient management. The lack of such legitimate benefits and enabling environments often compromises the status or professional credibility of health workers, adding to the burden of frequent shortages of financial or material compensation for time-consuming outbreak responses in outreach areas. In addition to perceptions about usefulness and benefits, acceptability (as defined in Thacker *et al*. 1988) relates not only to the instruments of surveillance data collection (i.e. too extensive or intrusive questionnaires), but also to ethical matters of confidentiality and data ownership. Finally, the local opportunity costs of surveillance have to be accounted well beyond strictly programmatic projections. Such costs impinge on both health workers (e.g. time burden, distraction of limited human resources from curative facilities) and communities (e.g. user fees for public health laboratory services), and they have yet to be addressed properly in resources-poor countries.

Alternative options to traditional public health surveillance

In order to address the shortcomings of traditional communicable diseases surveillance, new strategies have been proposed.

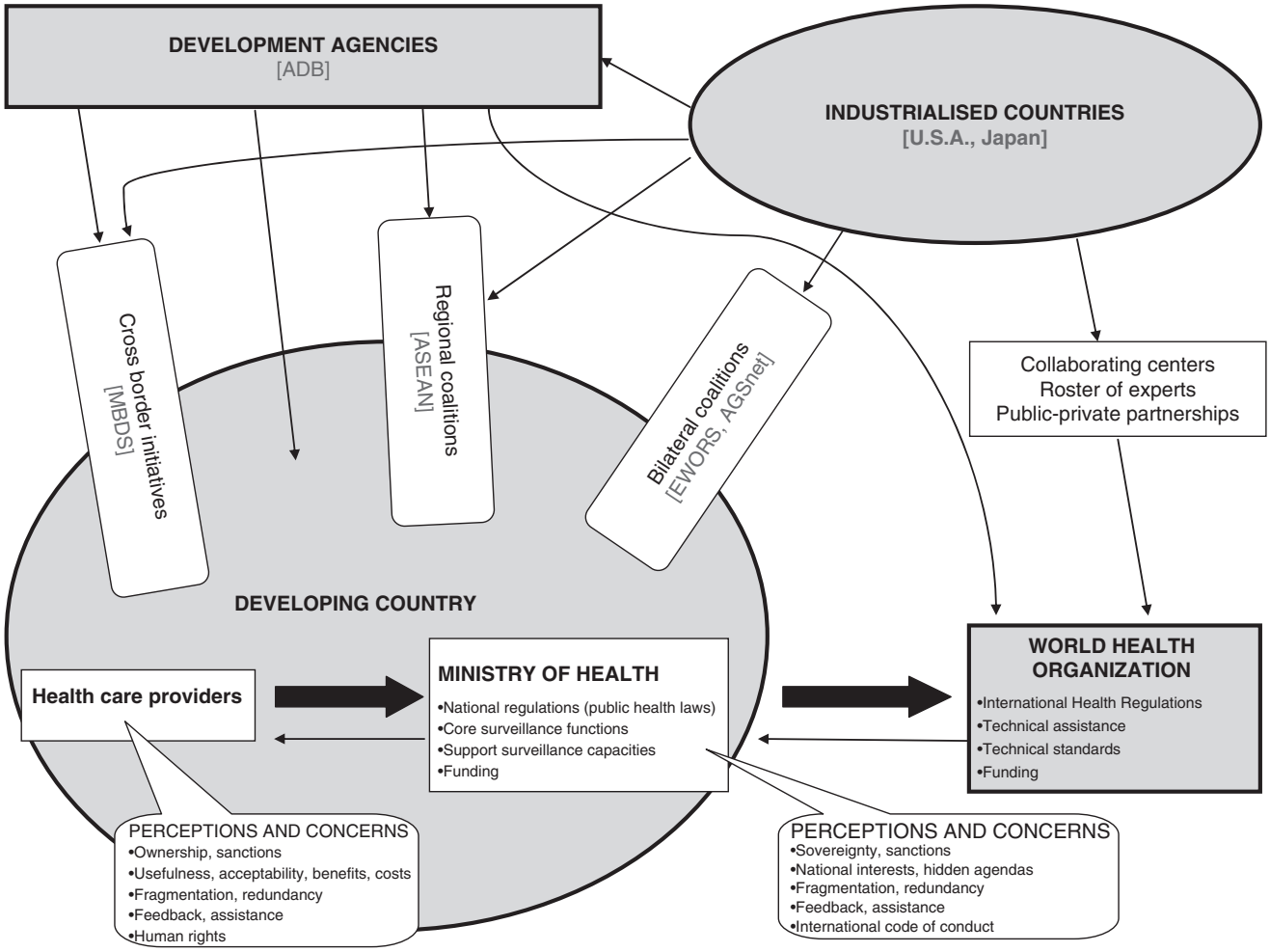

Figure 1 Relationships between classical actors, institutions or initiatives involved in national, regional and global public health surveillance

This figure summarizes the main relationships between classical actors, institutions or initiatives involved in national, regional and global public health surveillance. The official flow of information (including 'outbreak intelligence') is represented by thick arrows. Thin arrows indicate inputs. To further depict the complexity of relationships, thin arrows can also be reversed (separately or under various combinations) to represent feedback pathways channelling occasional/fixed, formal/informal, direct/indirect information, and through which additional surveillance data can flow between agencies.
Acronyms and country names in brackets are examples pertaining to the 2005 situation of Lao PDR, as described below.
ADB: Asian Development Bank;
MBDS: Mekong Basin Diseases Surveillance Project;
ASEAN: ASEAN Disease Surveillance network;
EWORS: Early Warning Outbreak Recognition System;
AGSnet: Alumni for Global Surveillance network.

Typically, the backbone of a surveillance system is a list of selected and specific diseases for which reporting to the health authorities is mandatory. This *disease reporting* approach often requires laboratory confirmation, depending on the micro-organisms considered. An alternative surveillance system has been proposed, based on *syndromic reporting*, allowing the recognition of a notifiable condition using pre-defined sets of purely clinical criteria (syndromes). Disease-specific (traditional) and syndromic reporting systems are not necessarily exclusive, and either approach can be applied as best fit to specific conditions in a national list of communicable diseases. In theory, the syndromic approach is well suited for emergency situations, when no delay can be tolerated for laboratory confirmation before public health action. Accordingly it has been advocated, albeit with much scepticism, for the detection of deliberate releases of chemical or bacteriological agents (Buehler *et al.* 2003; Reingold 2003). Aiming at better performance in the detection of deliberate outbreaks, some authors (e.g. Buehler *et al*. 2004) have broadened the scope of syndromic surveillance by including under its definition new indicator data types that are not directly related to clinical conditions seen in single cases. Such new indicator data include: volume of tests requested from laboratories, log sheets from emergency departments and ambulances, volume of prescriptions for specific drugs, and absenteeism.

Pending evaluations of such innovative approaches, more conventional symptom-based syndromic surveillance systems have been piloted in a number of settings. In the Republic

of Serbia, a new early warning component of the existing surveillance system has been piloted and evaluated, based on syndromic reporting (WHO 2004b). It was variably accepted by users, and sometimes perceived as a duplication of existing activities. In Mpumalanga Province, South Africa, the syndromic approach has been implemented through a network of infection control nurses working in all public and private hospitals of the province. The initiative is credited with some success in the rapid identification and response to outbreaks of cholera and meningococcal disease (Durrheim *et al*. 2001). The same sub-national syndromic surveillance system was later adapted to Tuvalu, a small Pacific island nation, leading to improved surveillance indicators and several successful responses to outbreaks (Nelesone *et al*. 2006). Finally, pilot initiatives of syndromic reporting have been sponsored in Indonesia and South-East Asia by the US Navy, as a way to circumscribe the shortage of peripheral laboratories (U.S. Naval Medical Research Unit No.2, Jakarta, Indonesia 2005).

Whatever their merit, these initiatives are reporting systems based on health care. It is unlikely that they could capture most events of public health importance in countries with low coverage, access or utilization of health facilities. In a distinct approach, medical anthropologists have advocated the involvement of traditional healers in surveillance (Groce and Reeve 1996), but validation through field operational research is still lacking.

Recognizing implicitly the poor performance of formal surveillance systems (i.e. those based on traditional public health infrastructures), WHO has been broadening the data source base for global surveillance by incorporating informal sources of information such as: the mass media, electronic discussion groups, non-governmental and faith-based organizations. This new development has been popularized under the meaningful term of 'infectious disease intelligence' (Heymann *et al*. 2001). It is routinely exercised by a dedicated team of surveillance officers gathering and analysing daily information captured worldwide through electronic technologies based at WHO Headquarters. Perhaps not surprisingly, over a 2-year review of the system, WHO officers found that 71% of their initial surveillance reports were retrieved from informal or unofficial sources and only 29% from official sources (Grein *et al*. 2000).

Based on such observations, national surveillance institutions have been encouraged to set up their own capacity for retrieval of informal information, and to exploit 'rumours surveillance' to improve their data-gathering performance. Rumour surveillance is meaningful only when adequate human resources can be allocated to the systematic collection, verification and analysis of unofficial information, most of which will lead to false alerts. This might be problematic in developing countries where ministry staff are already overburdened with the management of official surveillance reports. Besides, the extent to which local media, non-governmental organizations or local communities are encouraged or willing to report health conditions through informal channels is limited by other considerations, such as confidentiality, freedom of the press, penalties for bypassing hierarchical pathways (Fidler and Gostin 2006). Under the new IHR(2005), it will be legitimate for WHO representatives to ask national health authorities to take some accountability for health events that they have not reported officially (or simply ignored), and which were captured through such informal channels.

Although official and informal surveillance mechanisms might simply be seen as complementary, the above examples and considerations reveal an implicit acknowledgement that existing health systems have failed to provide or to sustain the necessary infrastructure for global surveillance. The increasing reliance on informal data for outbreak intelligence is also a telling illustration of global surveillance initiatives and health systems infrastructures drifting apart on the international agenda, with the risk that core public health funding will increasingly be diverted and earmarked for categorical surveillance programmes.

Different stories from developing countries

To give an accurate and comprehensive overview of the current level of preparedness of public health surveillance systems in developing countries is almost impossible. The task would be limited by the amount and quality of published references, by publication biases, by the type of standards set, or by the subjectivity of the observers. It is probably reasonable to say that the overall picture is one of mixed achievements, with several success stories emerging against a backdrop of uncertain predictions, conflicting priorities and external pressure. In the end, to what extent developing countries are successfully engaged in global surveillance is a matter of personal judgement, inseparable from one's views about health priorities and strategies.

The following examples are grounded on peer-reviewed publications (Uganda, India, Cambodia), official WHO documents (Uganda) or the mapping of official agencies (Lao PDR). They are selected simply to draw attention to some contrasts, knowledge gaps or to important lessons.

Uganda

In 1998, the WHO Regional Committee for Africa adopted a regional surveillance strategy (IDS) for priority communicable diseases, based on an integrated approach (WHO, Regional Office for Africa 2001). This strategy was implemented in Uganda, following a comprehensive assessment of the national surveillance system in 2000 (WHO 2003). With strong donor support, all the core and support functions of surveillance defined by WHO were established or strengthened. After 1 year, the performance of this initiative was comprehensively evaluated. As measured through output indicators, considerable progress had been made. Strong political commitment has been critical to this success, and this commitment has translated into the creation of a budget line for surveillance. The initiative is also credited with the rapid control of an outbreak of Ebola haemorrhagic fever.

Uganda is an interesting context where recent success in economic growth has been paralleled by a decline in social welfare (Okuonzi 2004). In the 1990s, the health sector reform driven by donor countries had led to lesser investments in public hospitals, reducing access to basic curative care. This means that the latest investments in surveillance under the IDS are building upon a fragile infrastructure base, as far as the

formal reporting capacity from curative sources is concerned. Apart from territorial disparities due to the pending rebellion in northern and eastern Uganda, the consequences of the health sector reform raise obvious questions of sustainability of the IDS initiative, even if integration efforts are well understood.

India

With variable success, Indian States have put in place official surveillance systems, the performance of which can be traced in the peer-reviewed medical literature. The Multi-Disease Surveillance System (OMDSS) implemented in Orissa is based on the weekly reporting of 12 syndromes from government health units. It is considered robust by international standards and its performance has been analysed on the occasion of an outbreak of leptospirosis (Jena *et al*. 2004).

However, the best documented sub-national surveillance systems originate from South India. Building upon a local surveillance system for vaccine-preventable diseases established in 1984, Dr T Jacob John and colleagues have piloted, in one district of Tamil Nadu, a surveillance research project scaled up to include a simple, multi-disease, health facility based reporting system, as well as a modest sentinel laboratory. This system ran parallel to but independently from national agencies collecting data on malaria and HIV infection, and from the allegedly inefficient reporting system of Tamil Nadu State. There was thus no real attempt at integration with existing systems, but the success of the project was remarkable. As summarized by the authors:

> 'reasons for the success and sustainability of this model include: simplicity of reporting procedure, low budget, private sector participation, personal rapport with people in the network, regular feedback of information through a monthly bulletin, and the visible interventions consequent upon reporting.'
>
> (John *et al*. 1998)

In addition to these reasons, it appears that there was clear political commitment from district and state health authorities. Equally relevant is the fact that the entire project was run voluntarily by one single private, academic institution. In 1998, a very similar model was adapted for the surveillance of 14 communicable diseases in one district of Kerala State (John *et al*. 2004). It was designed as an early warning system with immediate reporting by clinicians, bypassing the need for laboratory confirmation or field epidemiological investigations. Good performance over the two following years was illustrated by the capacity to detect early and to control rapidly several outbreaks of emerging or recurrent epidemic-prone infections. The model was scaled up to include other districts. By October 2002 it was established in the entire territory of Kerala State and management was handed over to the state health department. Beside the ingredients for success listed above, this story illustrates the merits of a low-budget, bottom-up approach proceeding on a trajectory that is far away from the gravitational forces of major donor agencies. In this respect, the next example is a contrasting one.

Lao PDR

In 2003, Lao Popular Democratic Republic (Lao PDR) was the lowest ranking East Asian country on the UNDP Human Development Scale. It is at great risk of failing to meet the Millennium Development Goals. Available curative services are essentially state-run, delivered through a network of poorly funded central, provincial and district hospitals. In a Country Overview by the World Bank (2005), analysts have indicated four main health sector issues in Lao PDR: (1) utilization of health care services is very low; (2) the quality of curative services is extremely poor; (3) financial resources are scarce and inequitably distributed; and (4) the capacity of health sector workers, administrators and managers is very low.

The national public health surveillance programme geared to outbreak detection is administered by the National Centre for Laboratory and Epidemiology (NCLE), which routinely monitors 18 epidemic-prone diseases through weekly reporting from health facilities. Other national centres or constituencies under the Ministry of Health collect data on specific diseases such as malaria, HIV/AIDS, SARS and avian influenza. In a few sub-national (provincial or district) health offices, some foreign cooperation projects support more limited initiatives in accordance with the national surveillance programme.

Against this background, several regional or global initiatives (Figure 1 and Box 1), funded by foreign donor organizations or governments, promote distinct surveillance projects for communicable diseases, under different formats and with different agendas. Adding to or building upon the national public health surveillance programme, they use part of its human workforce for data collection. It is not yet clear how the surveillance component of a more recent project of the Asian Development Bank, the 'Regional Communicable Diseases Control Project' (Asian Development Bank 2005) in the Greater Mekong Subregion, will adjust to existing partnerships.

In a context where the acute shortage of skilled human resources and the great difficulties of the curative sector will remain unsolved for years, it is difficult to imagine how the multiplication of parallel and poorly coordinated surveillance initiatives, and their targeted funding, will achieve much more than consolidating a fragmented, inefficient and disruptive donor-driven surveillance industry.

Box 1 Some examples of regional or global surveillance initiatives implemented in Lao PDR

- The ASEAN Disease Surveillance network is a regional initiative by ASEAN (Association of Southeast Asian Nations) countries to promote cooperation through the exchange of outbreak information (ASEAN 2006).
- The EWORS (Early Warning Outbreak Recognition System) network, supported by the US Navy Emerging Disease Program, is a sentinel project based on syndromic reporting (U.S. Naval Medical Research Unit No. 2, Jakarta, Indonesia 2005).
- The Mekong Basin Diseases Surveillance Project (MBDS) is a regional cross-border initiative supported by the Rockefeller Foundation (MBDS 2006).
- The Alumni for Global Surveillance network (Arita *et al*. 2004) is a sentinel surveillance system sponsored by the Japan International Cooperation Agency (JICA).

Cambodia

In countries with sparse curative infrastructure, there is an important limitation to surveillance systems (either traditional or syndromic) that are based on health facilities: many events of public health significance occurring in rural, underserved areas will never be captured by official surveillance reports. Involving communities directly might be the solution. While examples of community-based initiatives abound, the driving force has generally been a single disease or condition targeted by vertical programmes. In contrast, a pilot study implemented in several districts of Cambodia has shown that a more comprehensive strategy is feasible, efficient, sustainable and easily affordable (Oum *et al*. 2005). Village health volunteers were trained to report monthly five diseases or syndromes, together with a few vital events. They were also trained to detect clusters of cases, triggering immediate reporting. Their performance was validated through an independent household survey. The authors of the study mentioned the following key elements of their success: instant feedback, simplicity and decentralized management.

Drawing lessons from contrasts

The examples from countries illustrated above show two apparently contrasting facets of traditional surveillance programmes at national or sub-national level. On the one hand, a growing body of evidence suggests that practical surveillance solutions that take account of existing health infrastructure weaknesses in developing countries are feasible and efficient. Yet publication biases are likely to favour the description of successful initiatives, and we should be cautious in drawing any conclusion about the portability and sustainability of the experiences reported from Uganda, India or Cambodia. Some ingredients of success are clear however. The attributes that underpin a successful surveillance system in developing countries include: simplicity, community participation, ownership, feedback and personal relationships with field surveillance agents.

On the other hand, the case of Lao PDR is of a different nature. It does not invalidate the merits of establishing single, unified and streamlined national or sub-national surveillance systems. Lao PDR exemplifies the adverse effects of supra-national initiatives, a topic that is barely alluded to in the peer-reviewed literature. Applied to other countries, the analytical framework described in Figure 1 would probably reveal global and recurrent patterns of disruption by supra-national processes. The model could also support a more quantitative approach to determine the opportunity costs of fragmented and externally driven surveillance. This would add important upstream considerations to the more traditional frameworks for evaluating public health surveillance systems (Buehler *et al*. 2004).

Communicable disease surveillance: integration or new categorical programmes?

The global eradication of smallpox in 1977 was a formidable success of international cooperation, and a demonstration that global public health surveillance can be, under specific conditions, very successful (WHO 2005b). An equally successful achievement is about to be reached in the coming years with polio eradication, through the international surveillance of acute flaccid paralysis (AFP) (Heymann *et al*. 2004). However efficient and appropriate they may be, these 'categorical' interventions carry a price to pay at the expense of public health services (Navarro 2004). This is the classical problem of vertical public health programmes, for which there is no better illustration than specific infectious disease control initiatives. More comprehensive approaches might not be immune to such drawbacks. For instance, the Global Fund for AIDS, Tuberculosis and Malaria (GFATM) initiative has apparent strength in promoting partial integration through sharing resources between three related programmes. In reality, time will show how many countries supported by the GFATM have the managerial capacity to avoid creating a new vertical programme of equal or higher dimensions than the sum of its components.

Recognizing the danger of categorical interventions represented by parallel surveillance programmes, WHO has judiciously elaborated on an integrated approach toward communicable disease surveillance, a 'paradigm shift' in the words of its proponents (WHO 2000). Advocating a stepwise integrative strategy, WHO has been successfully promoting the expansion of additional surveillance components (starting with vaccine-preventable diseases), around the nucleus of national surveillance programmes for the detection of acute flaccid paralysis, under the global polio eradication initiative (WHO 2004c). This concept is of great value, but it will meet a number of technical, programmatic and political limitations. Technical limitations are inherent to different biological or epidemiological features of diseases (e.g. surveillance for anthrax or HIV/AIDS have different requirements for detection). Programmatic constraints result from the split of different disease control programmes between different constituencies (typically inside Ministries of Health or occasionally between ministries). Political factors involve a game of complex interactions between donor agencies, academic institutions and civil servants, ruled by funding opportunities. The latter two limitations (programmatic and political) belong to the realm of governance and could be lifted if driven by strong commitment and leadership, inspired exclusively by public health interests.

In the case of outbreak-prone diseases falling under the IHR(2005), the open and encompassing definition of events requiring national preparedness and mobilization of resources adds another dimension to integration, as illustrated through the following examples. Eradicating smallpox was about fighting a single disease, with a single standardized set of interventions (including case detection and vaccination). This was achieved at considerable expense of money and workforce, but it could be implemented through a time-limited extra strain on public health systems. By contrast, a simple multi-diseases reporting system reflecting the patterns of locally endemic conditions and supported by a single donor institution still seems sustainable over the long run in countries capable of maintaining their health system in parallel, as exemplified by the experience of Kerala.

Moving one huge step further away from common existing local priorities, what the IHR(2005) call for is universal alert, preparedness and responsiveness to moving or unpredictable targets, exemplified by SARS, pandemic influenza or the deliberate release of microbial agents. Even in the USA, the cradle of modern public health surveillance, intrusion of a new communicable diseases agenda has been problematic and federal prioritization of preparedness against bio-terrorism after 2001 has put local or state public health departments under strain (Reingold 2003). Thus, even more than with the categorical initiatives of smallpox or polio eradication, there is considerable risk that public health services of resource-poor countries will feel the disruptive effects—more than the benefits—of joining the global surveillance agenda, through the very elusive nature of the threats that it covers. Along the same line and taking Laos as an example, Keith Bradsher (2006) has commented recently on the trade-offs chosen by donors between short-term programmes for fighting bird flu and longer-term programmes that may carry broader health benefits: 'The danger, even some managers of bird flu programs are starting to say, is that donors focus so intently on a single disease that they unintentionally disrupt many other health programs'. Finn Reske-Nielsen, the top UN official in Laos, acknowledged with good reason that: 'We could overlook that people could quite literally be dying because of this'.

Discussion and conclusions

The latter considerations are not principled argument against the establishment or the strengthening of a global public health surveillance agenda. In view of the overwhelming and universal hazards posed by emerging diseases, a precautionary principle is rightly being applied. With remarkable accuracy so far, the proponents of global surveillance have developed a regime of networks, strategies and operational tools culminating with the recent adoption of the IHR(2005). We all know that the worst can happen and the SARS epidemic of 2003 has been a warning signal, now superseded by the widespread epizootic expansion of avian (H5N1) influenza. But to what extent should alarms distract policy-makers from sustained and blatant emergencies, such as major endemic diseases, the breakdown of health systems or the much neglected shortage of local professional skills? Science has its limitations, inasmuch as it cannot predict the outcome of complex situations where deterministic chaos applies, like epidemics. Science can simply define this complexity by a limited number of its linear elements, and feed decision-makers with facts and pondered uncertainties. Prioritization of health programmes is thus ultimately a matter of judgement, considering in this case the balance between known scourges and elusive disasters. This should be acknowledged.

Concerns about the international spread of diseases are not new. What is new is: (1) the broader scope of identified 'emerging' or 're-emerging diseases'; (2) the extent of globalizing factors that unleash them; (3) the intrusion of new actors in the arena of public health surveillance, bringing economic or security concerns in; (4) the blurred limits between potential hazards of deliberate and natural outbreaks; and (5) the ever-increasing demand from the public and press agencies for real-time information.

These novelties have entertained the distorted view of global surveillance as an overwhelming and singular priority in health, a view that is now being embraced by major donor agencies. As shown in this paper, this phenomenon carries a risk of further disruption of fragile health systems, and of creating a new complex categorical (vertical) intervention with global dimensions and moving borderlines.

It is fortunate that the forces driving globalization (and its collateral effects on health and lifestyles) are providing at the same time communication instruments that enhance public health surveillance through universal access to informal information sources. But in this way, official health infrastructures are becoming marginal—if not dispensable—in their contribution to fuelling global 'outbreak intelligence'. As demonstrated by experience in southern India, the main characters to be empowered in surveillance programmes should be the front-line health care providers, who are entitled, in return for their participation, to expect more assistance in daily encounters with patients, and obviously during times of epidemics. Likewise, communities can only be motivated to report on unusual events by the reward of free, accessible health care. This is to say that curative and public health sectors cannot be dissociated in this exercise, and that initiatives to fund surveillance programmes cannot work in abstraction from overall deficiencies of health systems.

At international level, it is not enough to acknowledge the global threat of emerging or re-emerging diseases and to focus on a strategy based on externally driven surveillance and response. With equal urgency, preparedness for future epidemics has to include a parallel overhaul of health systems, including the essential issues of human resources development, governance and equity in access to care. Yielding and complacency toward multiple donor-driven initiatives result in further disruption of weak health systems and contradict the rhetoric of promoting integration in public health surveillance.

At a time when a clock predicting the next influenza pandemic seems to tick close to its detonation time, it is perhaps incongruous to advocate the revisiting of policies framing global public health surveillance. But if the main legacy of global surveillance policies consists merely of a summons to plug into a virtual 'network of networks', and to welcome foreign investigators donning bio-protective equipment, we will fail in our duty to protect the most vulnerable populations during a pandemic of some magnitude. No developing country is currently in a position to absorb the shockwave of extra hospital-based care brought about by a pandemic of influenza, or to organize universal access to protective or preventive measures, should the latter become available. At this time, there is no escaping from the conclusion that the harvest of outbreak intelligence overseas is essentially geared to benefit wealthy nations.

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