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Political epidemiology: Strengthening socio-political analysis for mass immunisation – lessons from the smallpox and polio programmes

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Control and reduction of infectious diseases is a key to attaining the Millennium Development Goals. An important element of this work is the successful immunisation, especially in resource-poor countries. Mass immunisation, most intensively in the case of eradication, depends on a combination of reliable demand (e.g. public willingness to comply with the vaccine protocol) and effective supply (e.g. robust, generally state-led, vaccine delivery). This balance of compliance and enforceability is, quintessentially, socio-political in nature – conditioned by popular perceptions of disease and risk, wider conditions of economic development and poverty, technical aspects of vaccine delivery, and the prevailing international norms regarding power relations between states and peoples.

In the past 100 years, three out of six disease eradication programmes have failed. The explanations for failure have focused on biotechnical and managerial or financial issues. Less attention is paid to socio-political aspects. Yet socio-political explanations are key. Eradication is neither inherently prone to failure, nor necessarily doomed in the case of polio. However, eradication, and similar mass immunisation initiatives, which fail to address social and political realities of intervention may be. A comparison of the smallpox and polio eradication programmes illustrates the importance of disease-specific socio-political analysis in programme conceptualisation, design, and management.

Keywords: socio-political analysis; mass immunisation; smallpox; polio

Introduction

Control and reduction of infectious diseases is not only critical to the Millennium Development Goals (MDGs), but also to maintaining and extending global health gains made in recent decades. The imperative is given additional force by 49 new and re-emerging infectious diseases declared a global crisis by WHO in 1995, and is further strengthened by recent events involving Severe Acute Respiratory Syndrome (SARS) and avian flu. A key weapon in the fight against such diseases is, and will continue to be, the development and use of vaccines, specifically via mass immunisation programmes.[1]

This paper focuses on disease eradication. At the extreme end of population-level disease management, it illuminates powerfully some of the often latent aspects of more moderated approaches to infectious disease (e.g., elimination, control). This is not to suppose, though, that eradication is uncontroversial. There are many critics

who feel that its vertical structure and potential draw on resources (especially in the latter stages of implementation), can impact adversely on attention to wider health challenges and on the processes by which national and local capacity to address those challenges can be built up.

That said, there is little question that an eradicated disease constitutes an unusually pure form of global public health good (De Quadros 2002). It is also arguable that at the local end of implementation (as I will suggest), the population-intensive nature of eradication ultimately forces stakeholders to focus more, than is often the case, on conditions of inequity among groups, and those in the population living in conditions of extreme exclusion and disadvantage. However, eradication-scale immunisation programmes cannot be operated in a vacuum. Eradication relies on absolute commitment among all engaged parties. That commitment will be stronger where the eradication programme contributes to the sustainable establishment of wider benefits primarily, though by no means exclusively, in terms of improved primary healthcare capacity (Taylor *et al.* 1997).

Immunisation, in any case, is not a one-size-fits-all proposition. Different diseases, manifesting through different epidemiological patterns and epidemic attack rates, provoke quite different popular perceptions of risk (risk of disease, but also, of course, of the vaccine itself) and, thus, widely variable public views about the value of mass vaccination operations. These views are themselves conditioned, most intensely among the poorest in developing regions, by wider socio-economic experiences – the daily management of acute survival needs, often alongside chronic social, economic, and political disenfranchisement. Perceived imbalance among recipients, between exaggerated emphasis on one disease (and its immunisation programme), and negligible emphasis on a panoply of other health and non-health ills at the local level, can lead to an unfavourable popular view of the immunisation programme, and antagonistic interactions between vaccine programme workers and households.

At a broader level, the whole principle and practice of mass immunisation is itself conditioned by the international context of norms regarding state–society relations and public health interventions, particularly concerning the thorny relationship between individual and collective rights. These concentric social, economic, and political contexts, significantly determine the efficacy of mass vaccine programmes at the point of delivery. Understanding the microcosm of vaccinator-recipient encounters in relation to these wider contexts – through thorough and detailed socio-political analysis – is vital to programme planning, management, and outcome.

Several of the key insights claimed, and assertions made, through this paper, are drawn from the author's direct experience working as a consultant to the Polio Eradication Initiative (PEI), between 2002 and 2004, in Nigeria, India, and Pakistan. Where the evidence is drawn from such experience, observation, documentary analysis and/or interview, it is so noted.

Three questions (each informing the others) can help in strengthening disease-specific socio-political analysis for mass immunisation programming:

1. How is disease risk perceived, relative to wider concerns affecting a given locality and what, therefore, are the likely popular cost-benefit analyses of compliance and non-compliance?
2. Relative to non-compliance, how enforceable is the vaccine delivery technology?

3. Relative to technical enforceability, how tolerant is the wider (national and international) environment to forms of programme enforcement?

Developing eradication criteria

There have been six attempts to eradicate a human pathogen during the twentieth century: yellow fever (1915); yaws (1954); malaria (1955); smallpox (1958); dracunculiasis (1986); and poliomyelitis (1988).[2] Of these, one has been certified successful (smallpox), two are ongoing (guinea worm and polio), and three have been abandoned or converted into regional or 'control' programmes. Each new eradication effort (evolving, characteristically, out of smaller-scale regional control and elimination programmes) has attempted to learn from its forebears. In this process, criteria by which to assess disease eradicability have evolved (Olive *et al.* 1997, Aylward *et al.* 2000, Molyneux *et al.* 2004). In certain key respects, however, that evolution has remained limited in the degree to which socio-economic and political conditions are conceptualised, and, perhaps more importantly, the way those considerations have, or have not, adequately informed programme design and implementation.

The dominant explanation for failure of past eradication attempts focused primarily on biotechnical feasibility (Yekutiel 1980, Aylward *et al.* 2000). Yellow fever was discovered to have multiple vectors; malarial mosquitoes developed resistance to Dichloro-Diphenyl-Trichloroethane (DDT); and yaws undermined surveillance through long periods of latent infection. In each case, complementary explanations focusing on social and political issues have too often been reduced to a footnote, or overlooked altogether.[3]

After World War II, progressive attempts were made to expand the criteria for selecting diseases for elimination/eradication, influencing, at least in theory, approaches to vaccine-delivery programme design. Hinman (1966), for example, recognised a problematic relationship between eradication as a public health good and the political context of individual rights: 'Eradication schemes inevitably seem to come into conflict with human rights ... Education of the public will be extremely important, but it must be recognised that some violation of human rights and privileges will occur ...'. However, his acknowledgement of a popular socio-political dimension is tempered, by the apparent assumption that violation is the acceptable consequence of operationalising a greater good. His concluding 'elements for global eradication success' remain, therefore, perhaps unsurprisingly, substantively devoid of a socio-political requisite.[4]

Yekutiel (1980) identified six pre-conditions for eradication, grouped under the two following categories: *technical-epidemiological and socio-economic; operational and administrative*. These criteria, in an obvious sense, promoted the importance of understanding the role of the state, and not simply as central or national government, but in terms of the broader field of political constituencies.[5] However, the potentially detrimental actions of people, more generally, to programme efficacy were characterised primarily in terms of 'herd' behaviour – population migrations, sleeping patterns, prevailing approaches to hygiene and so on. Such analysis appears not to have recognised the possibility that programme-adverse behaviours might be

rational or strategic. The concept of active, considered programme obstruction, does not figure prominently in this work.

International epidemiological conferences in Dalhem (1997) and Atlanta (1998) established the International Task Force on Disease Eradication (ITFDE), which identified three modified groups of eradication criteria: *biological and technical feasibility*; *costs and benefits*; and *societal and political considerations*. Although the 'societal and political' now had their own category of analysis, that analysis was focused primarily at the level of the nation-state. It did not, in any explicit sense, recognise the in-country complexity of heterogeneous and potentially conflicting groups (especially in societies with high socio-economic inequality), and the commensurate potential for diverse (including negative) reactions to programmes such as immunisation. In a corollary fashion, the ITFDEs emphasis on the need for positive engagement between participating states and the multilateral agencies – the only viable sponsors of transnational disease control – underplayed the ambiguous, and sometimes difficult, relationship between multilateralism and national sovereignty that has characterised the post-war period (Molyneux *et al.* 2004).

The political epidemiology of disease control

'Political epidemiology' – the analysis of the social, economic, and political conditions affecting disease management interventions – can contribute to mass vaccine programme planning and implementation, both inter- and intra-nationally. Between countries, control of infectious diseases (including the end-point of eradication) has been, and will in all likelihood continue to be, sponsored at a global level through multilateral institutions, yet operationalised through national governments. Inherent in this, is the potential for conflict between a transnational mandate to provide global public goods, such as disease control, and the Westphalian inviolability of nation-states' right to determine their domestic (including health-related) agenda.

Within countries, the degree of popular fear inspired by a given disease, combined with the degree to which control measures can be enforced (itself a combination of biotechnical and political factors that centre on the nature of vaccine delivery technology), generate a kind of disease-specific social contract. Where other socio-economic or political concerns, or contests within a population override that disease-specific social contract, the immunisation programme, dependent on cross-population compliance for success, can unwittingly become the forum in which those other concerns and contests are played out. By requiring close to 100% population compliance, immunisation programmes provide to sub-groups engaged in wider relations of dissent (the more so in the liberal-democratic model of contemporary development), an unusually intense medium through which to express that dissent.

Socio-politically and economically marginalised communities within a state are often those least likely to be adequately served by basic services such as health. As an eradication effort progresses, conventionally dispossessed groups become increasingly centrally the programme's target, and their willingness to comply with vaccination becomes increasingly vital (not least as per capita programme costs rise). At its most critical end-stage, then, eradication depends on, and thus empowers, even relatively small, socially disaffected sub-groups, providing them with a profoundly powerful platform through which to articulate much wider issues

of dissatisfaction and dissent.[6] Where enforcement is politically untenable and/or technically unfeasible (for example, where vaccine technology dictates repeating, and negotiated, household interactions), programmes need to engage seriously with these wider societal effects.

Smallpox and polio

Few would question that smallpox constituted a global priority for health intervention. Recognised as a worldwide scourge for hundreds of years, it is estimated to have killed 300,000,000–500,000,000 people around the world in the twentieth century alone (Bazin 2000, Koplow 2003). The major type of the smallpox virus was devastating in epidemic scale, produced highly visible and notorious symptoms in all cases, killed approximately 25% of infections, and left survivors permanently scarred.

Poliomyelitis, by contrast, was only recognised as an epidemic disease in the last century (Oldstone 1998), with estimated global infection rates in 1988 of around 350,000 a year.[7] Most polio infections are 'silent, inapparent and harmless' (Paul 1971), with 200–1000 sub-clinical cases between symptomatic cases of paralysis, a proportion of which are self-correcting or self-limiting (Daniel and Robbins 1997). Although clearly a prominent and fearsome health issue to the relatively advanced economies of Europe and North America at the start of the last century (Gould 1995), polio did not have the same global status as smallpox, particularly when set in the context of wider poverty and ill-being in poor countries of the South. In consequence, programmatic intervention against polio has encountered, in some instances, a debilitatingly ambivalent popular and institutional response in some of those countries, in particular where intervention is seen as disproportionate to perceived risk, disproportionate to the paucity of other health services, and disproportionate in terms of its drain on already thinly stretched local resources.[8]

Smallpox was almost universally considered the ideal candidate for eradication (Yekutiel 1980, Clift *et al.* 1993).[9] Its epidemiological character lent itself strongly to the kind of authoritarian imposition from which mass-compliance health programmes can benefit: the 'distinctive clinical signs' (including scarring 'useful for surveillance'), relatively slow confined spread ('rarely more than two to five persons infected by any one case'), 'absence of chronic carrier state', and characteristic of face-to-face transmission, made it relatively easy, and socio-politically acceptable to police through aggressive population investigation and containment methods. Poliomyelitis, meanwhile, is virtually unpolicable in these terms, travelling great distances in an inapparent form, infecting latently, and leaving behind excretors to maintain transmission. Fear of smallpox, combined with technical and global-political possibilities of aggressive intervention, validated tolerance for considerable programme enforcement. People, and governments, were afraid of smallpox, submitting themselves to heavy disease policing. The intervening programme could see, trace, track, and trap cases as they emerged and spread.

The epidemiology of polio, by contrast, has neither been sufficiently fearsome to outweigh the perceived benefits (among some groups at least) of dissent, nor, even if population uniformly supported a heavy policing approach, is it capable of similarly verifiable and enforceable levels of surveillance, detection, and containment. During interviews conducted by the author between 2002 and 2004 with households in target

areas of Kano State (Nigeria), Uttar Pradesh (northern India), and Northwest Frontier Province (Pakistan), the view that poliomyelitis was a rare and relatively low-risk health issue, compared with other more pressing problems, was common amongst those expressing dissatisfaction (and non-compliance) with the regime of vaccination campaigns. In northern Nigeria, with new and more refined approaches to capturing local level data on households and children missed during the campaign rounds, 50% of non-compliant respondents (Katsina State 2007) cited 'No felt need', or 'Too many rounds', as the basis of their refusal to have infants vaccinated.[10] Polio it appears, is caught in a double-bind, on one hand lacking compliance inspired by popular fear, and on the other, forced to rely on compliance by virtue of its weak political and epidemiological enforceability.

Smallpox vaccination, compared with polio vaccination, was much more a 'one-off deal'. Introduced once into the recipient, it conferred significant immunity with a high level of reliability (there were virtually no infections among people following the second supplementary injection), and left a visible mark by which vaccination status could be independently assured.[11] Oral polio vaccine (OPV), by contrast, is consumed, leaving no visible sign of immunisation status and requires multiple deliveries to each target individual before immunity is achieved (up to six or seven doses in many countries where poverty and poor health reduce the efficacy of doses); in practical terms, households have received upwards of 10–20 doses in the course of several years of house-to-house campaigns in the last remaining endemic countries.

The different social interactions entailed by smallpox and polio vaccination technologies, compound the problem of differential public fear and programme policing. First, introduction of the smallpox vaccine to the target via injection could be achieved without a great deal of negotiation (notwithstanding, at this stage, questions around human rights). OPV, by contrast, requires, at a minimum, the opening of the recipient's mouth, more often than not, particularly in the case of newborns and under-twos, reliant on the passive or active collaboration of another family member (often the mother). Second, where smallpox vaccination required only one or two successful interactions between vaccinator and recipient, OPV requires multiple, repeating interactions.

Smallpox vaccination can be construed at the extreme, then, as a non-negotiable event. It was a one-way exchange, with power considerably more clearly on the side of the vaccinator. Polio vaccination, meanwhile, constitutes a truly iterative interaction in which, under the terms of game theory (Bauch and Earn 2004), the recipient and the wider community have the opportunity, over multiple vaccination campaigns, to *learn* the process. In particular, they discover the dependency of the vaccinator and the programme on their compliance. In the moment of polio vaccine delivery, quiet different to that of smallpox, practical power is more ambiguously distributed between the vaccinator and the target individual (and household), making the interaction more politically complex, and less reliable, in terms of outcome.

Finally, these mass vaccination programmes occurred in very different historical worlds. Smallpox eradication was implemented in the context of the Cold War. This appears to have produced a kind of bipolar competition to the advantage of the global programme between the Soviets and the USA, and the space this opened up for programme enforcement among client states in the developing world.[12] It is worth making the point here that this kind of militarisation of public health is highly problematic. In light of the post-9/11 environment, including the so-called 'war on

terror' and related concerns regarding bioterrorism, there is a possibility that governments may be tempted to revive authoritarian approaches to disease control.[13] This would be a mistake. In the long run, public health relies on relations of credibility and trust between those who provide such services and those who use them. Trust does not appear to respond well to force.

Nonetheless, international development discourse of the 1960s and 1970s – the core intensified period of the Smallpox Eradication Programme (SEP) implementation – took, as a central tenet, the primary role of the state in development activity, and its authority to enact, and enforce, top-down, technical programmes, at a national scale (Lea and Chaudhri 1983, Easterly 2002). Under the terms of this development, the balance of power between the state and the individual lay firmly with the former. By the 1990s, and the launch of the PEI, the dominant discourse had shifted to an almost diametrically opposed view of the proper form of development intervention, emphatically prioritising participatory, bottom-up, 'client-centred', development approaches (see, for example, Chambers 1983). Contemporary global paradigms of development apotheosise the interests perspectives and inalienable rights of the individual the household and the local community over the agenda of the state and include an often critical perspective on the role and influence of western programme-backing donors. Unlike SEP, PEI has had to deal not only with a weaker political epidemiology, but also with a programming environment in which the rights of non-compliance enjoy considerable stature relative to the opportunities for enforcement.

From the author's observation of the polio programme, and from interaction with programme staff between 2002 and 2007, it would be unfair to suggest that the PEI has failed to respond to the role of social context in programme effectiveness. Indeed, large-scale vaccination campaigns create the conditions by which operational hypotheses regarding effectiveness can be aggressively tested in practice (Henderson 1998a). In particular, faced with persistent levels of missed children, and in some cases evidence of poor service delivery by the vaccinators themselves, the programme has advanced considerably in its attempts to gather, combine, and use quantitative and qualitative data on missed households and children, and in a more in-depth analysis of the causes of non-compliance (Andrus *et al.* 2001). What may be of interest, from the author's observations, is the degree of struggle that has characterised that progress, within and between the programme partners themselves, between a somewhat simplistic, but politically safer, interpretation of vaccine non-compliance as the result of local ignorance, and the more nuanced, but politically risky, accession to non-compliance as associated with dysfunction within the programme itself, and/or wider conditions of socio-economic disadvantage and dispossession.

The following analysis – highlighting some of the deficit areas in socio-political analysis underpinning programme strategy – describes conditions in the polio programme predominantly during the period of the Nigeria crisis, between 2001 and 2005 (Pincock 2004, Raufu 2004a, 2004b). It looks, in particular, at this apparent preference among programme partners for an analysis of shortfalls in immunisation coverage that focused on non-compliant or 'resistant' households and on religious or educational reasons for such non-compliance (Unicef Nigeria 2004). And it explores the causes and consequences of that institutional programme preference.

Relating to the three questions posed earlier, we can reflect on conditions in the PEI in the years up to 2005–2006, and frame three propositions regarding the quality of socio-political analysis necessary for mass immunisation planning and implementation:

- First, non-compliance with immunisation (in PEI, but also more generally among vaccine-related programmes), has frequently been interpreted as the result of ignorance or of traditional or religious beliefs (occasionally treated the same as ignorance). This has resulted in strategies focusing on groups of somewhat essentialised actors (religious or 'traditional' leaders and their constituencies, 'hard-to-reach' groups and so on), and on approaches that focus on education to enlighten, or scientific argument to obviate, doctrinal positions. Where ignorance is the issue, education is good; where religious belief is the issue, negotiation and compromise can be effective. But, where non-compliance is the expression of wider socio-economic and political antagonisms (for example, between levels of government, or between groups experiencing forms of inequity and impoverishment), educational and informational strategies have very limited effect. In particular, such strategies fail to acknowledge people's capacity for rational, considered, and strategic non-compliance, and thus, fail to address the ways in which divergent popular interests derive strategic benefit in dissent from, and non-compliance with, whole-population programmes.
- Second, persisting categorical distinction, between biotechnical and social feasibility in mass vaccination programmes, misrepresents the reality of implementation. The encounter at the doorstep – between healthworker and household (not infrequently, young and under-trained vaccinators face-to-face with young and uncertain mothers) – is the centrepiece of programme success or failure. This encounter is simultaneously social and technical. Different technologies for vaccine delivery, and hence efficacy – distinguishing, for example, injectable from oral delivery systems – invoke often very different social relations (ranging from a significant capacity for enforcement, even among the unwilling, to an almost total reliance on negotiation). Thus, the nature of the programme 'hardware', that is, specific material aspects of vaccine delivery, affects, and is affected by, the social condition of the programme's doorstep interaction.
- Third, while the state may have played a decisive role in enforcing compliance with smallpox immunisation under the historical conditions of the Cold War world, the balance of power between state and population, contemporary to polio, has shifted dramatically (Matthews 1997). Socio-political analysis continues to assume and rely on the role of the central state in supporting immunisation programming (conflating the disposition of the central government with that of the country as a whole). It risks underestimating – and being unprepared to engage effectively with – the complexity of fragmentary internal social and political entities, which characterise many modern states, particurarly in poor countries with relatively intense competition for resources contextualized by weak institutional infrastructure.

India and Nigeria – similarities, differences, and lessons

There is a remarkable geographical overlap between the places around the world where smallpox and poliomyelitis viruses made, or are making, a stand against eradication – in India, the northern states of Uttar Pradesh and Bihar; in Nigeria, the north (primarily the central north) in and around the state of Kano. In both instances, persistent circulating virus, reflecting sub-optimal immunisation coverage, coincided with populations that were amongst the poorest and most dispossessed in their respective countries, and populations whose social identity, in both cases predominantly Muslim, occupied an antagonistic position *vis-à-vis* other socially dominant groups.

In northern Nigeria, by 1969, the city of Kano represented one of the last bastions in the entire country, not to say region, of circulating smallpox virus. As in India some years later, immediate and 'autocratic' measures were put in place – an intensified intervention entitled E^2. Enabled largely by the support of the traditional emirate system, by which much of the north of the country was governed, the smallpox programme was able to blockade all major roads into and out of the state capital, and institute heavy policing strategies for the encircled population. Within 12 months, transmission had been interrupted.

In the mid-1970s, in India, after several years of relatively poor results in reducing transmission of smallpox, a new strategy of 'active surveillance and rapid containment' was initiated, relying centrally on 'search operations' (Basu *et al.* 1979).[14] Under the auspices of the Union government, the programme deployed what can only be described as a paramilitary presence in key endemic areas of the north: 'Watchguards were posted in front of every affected house to restrict the movement of patients, to vaccinate all contacts and visitors, and to record movements if they were leaving the locality ....Contacts from the affected household who had left the area were traced and placed under surveillance'.[15]

Description of programme operations, following an outbreak in Bihar, leaves little doubt as to the scope of enforceability and the state's willingness to enforce: 'All bridges and major roads were barricaded and no one was permitted to enter or leave the epidemic area without an on-the-spot vaccination or proof of recent vaccination ... Employers were asked to refuse leave to unvaccinated employees ... Barricades were set up and no (railway) tickets were sold without evidence of recent vaccination ... trains were diverted to platforms that could only be reached by crossing the bridge over the rails and which was blocked by a checkpoint' (Basu *et al.* 1979).

The strategies deployed by the smallpox programme in India and Nigeria are striking for a number of reasons. They worked. And they did so in significant part by depending on forms of militarised enforcement that today, operated by an international community of developmental humanitarians, would be widely criticised as a fundamental abrogation of human rights. They are almost diametrically opposite to the strategies adopted for polio. Extant documentation of the last years of the smallpox programme do not record, or even recognise, a significant scale of non-compliance or 'resistance' as the explanation for coverage shortfall among the populations in these final endemic areas. It is arguable that this is less a reflection of universal popular approval for the smallpox programme and more a reflection that non-compliance was not seen as a meaningful issue, where enforcement and

enforceability were so socially and politically practicable. In stark contrast, unable to leverage anything like similar forms of enforcement, non-compliance has become perhaps *the* central feature of the polio programme's end-stage experience.

The following comments, on contemporary polio programme performance, draw on the author's involvement in performance analysis and on sustained engagement with a wide variety of programme partners, most intensively between 2002 and 2004, but continuing through 2005–2007.

Emerging analysis suggests that active non-compliance with polio vaccination is substantially associated with wider conditions of socio-economic disadvantage and dispossession. The non-compliance of individuals and groups, is often founded in much broader and longer-standing problematic relations regarding distribution of national resources, and political power.[16] This analysis, however, raises very difficult strategic questions regarding appropriate and effective responses, responses which could involve the programme (including politically sensitive UN agencies) in the treacherous terrain of domestic politics of the countries in question.

A key issue raised by the author's observations is the way in which the political contexts surrounding PEIs have impacted on the evidentiary processes by which such programmes should be guided. Powerful and complex socio-economic and political alliances and disputes running through partner countries, their governments, and populations, create sensitive and dangerous terrain in which international institutions engage at their peril. A result of this is that major institutional stakeholders in the polio programme have, at times, preferred to invest in an analysis which focuses on the religious and 'traditional' character of the communities themselves in obstructing immunisation – on implicitly or explicitly stated conditions of religious opposition to vaccines as unIslamic, or on ignorance, arising from illiteracy, engendering credence in 'false beliefs' regarding vaccine efficacy, safety, contamination, or impact on fertility – rather than on more structural, and essentially political, issues of national resource distribution, governance, and welfare. This is not to suggest that there is an absolute dearth of sound socio-political analysis. It is, however, to suggest that the interpretation of non-compliant groups, that has filtered down through the polio programme hierarchies (often populated by national and governmental workers whose sympathies with the excluded and resistant groups tend to be weak or non-existent), appears to have adopted the safest, or least politically sensitive, interpretations available, and to have developed, in response, communications and social mobilisation interventions designed to educate and reassure.

There is no doubt that education and reassurance have been of some considerable value in building bridges between especially excluded groups and immunisation programmes, such as that for polio. However, where the real issues, the real socio-political context underpinning the behaviour of individuals and groups passively or actively obstructing polio vaccination have little directly to do with religion in and of itself, or a lack of enlightenment regarding vaccine safety, but rather reflect fundamental and society-wide conditions of inequity, such approaches are likely to have only limited effect.

This is borne out by differences in strategy in the two countries. In northern India, polio agencies negotiated in 2004 a new programme approach with the government. The new strategy implicitly recognised the relatively disadvantaged general condition of Muslim communities in areas of the north (a politically sensitive issue nationally), but framed its response as a strategy for 'the underserved', thus

avoiding uncomfortable politico-religious connotations of Hindu–Muslim relations, whilst actively addressing some of the underlying social and political issues. Following this strategic development, progress towards interruption of transmission in India has seen considerable success.

Until recently, the Nigerian programme's key operational partners, by contrast, continued to espouse analysis and strategy emphasising communication and education to confront ignorance and 'false belief' over strategies designed to address, or at least mitigate, more fundamental socio-economic and political issues between the northern states and the federal government. As a result, the programme as a whole continued to encounter significant problems, acutely in the suspension or cancellation of immunisation activities in some northern states in 2003–2004.

From 2006 into early 2007, however, there are signs that new efforts, predominantly characterised by increased programme ownership on the part of northern states, but also by programme modifications to combine polio vaccination with other health services ('Immunisation Plus'), may improve the situation in Nigeria (though there are valid concerns that delivery of polio vaccine should not be obscured or confused by being bundled inadequately or inconsistently with other services). Nevertheless, the seriousness of attention given to the underlying political tensions remains key. Northern Nigeria constitutes probably the single greatest challenge to the polio programme worldwide. While those underlying social and political issues remain unaddressed, by a programme which prefers the political safety of educational problems, rather than recognising the wider problems of governance and the distribution of wealth and well-being, it is possible that the polio eradication programme here, and as a consequence globally, will find itself blocked in the last mile of a long race.

Conclusion

Successful disease control, vaccination, and eradication programmes depend on an enormous variety of often socio-politically sensitive conditions. Polio eradication, at this critical juncture, offers three important lessons regarding the way mass immunisation programmes recognise, prepare for, and act on political and societal conditions:

1. Non-compliance with immunisation is, without doubt in some instances, based on lack of information, suspicion, or alternative beliefs and views. But some, often a substantial part of, non-compliance, is the focused expression, in the uniquely democratising process of mass adherence programming, of broader social and political problems. Socio-political analysis, and programme strategy, that baulks at the socially and politically sensitive, is unlikely to produce much more than cosmetic results – arguably compromising good planning, prolonging the period of implementation, and endangering the chances of a successful outcome.
2. Over-emphatic distinction between the technical and the socio-political needs to be revisited. The idea that the *effectiveness* of an intervention tool can be assessed independently of the socio-political environment in which it is applied appears difficult to defend with respect to the recent experience of the polio programme. Biotechnical realities and social perceptions – of disease,

intervention tools, wider health services, broader household conditions – should be recognised as intimately bound together. This is particularly important with respect to recognising, and investing in, the vital socio-technical role of the vaccinator.

3. An analytical emphasis and programmatic reliance on an implicitly homogeneous state (via central government), can underestimate sometimes latent fractures in the wider society (between central and local governments, and between and within heterogeneous population sub-groups), wherein small minorities can find in mass programmes, and withheld compliance, an unusually powerful tool for leveraging marginal, or marginalised, socio-political claims. Programme planning needs to acknowledge and prepare for sub-national conditions, especially conditions of inequity. This may include directed ancillary programme investments towards a wider field of local projects in disadvantaged areas.

4. Effective prevention of infectious disease remains a central aspect of national and transnational health. Key to this is the development and use of vaccines. If transnational, and ultimately global, health initiatives are to continue to exercise some authority in relation to the policies, actions, and investments of individual nation-states and their heterogeneous populations, the concept and practice of vaccination will need to be both promoted and defended. In a world of increasing information flows, given the political dimension of vaccination as a key tool for control, elimination and eradication in public health, health institutions will have to ask an increasingly informed and perhaps sceptical public for its compliance.

5. This paper has discussed enforcement as a countervailing feature of immunisation to non-compliance. This is not to suggest the desirability, or practicality, of a return to Cold War militarisation of population health intervention. But it is to suggest the need to consider the question of individual and collective rights as they confront one another in the production of some vital national, and ultimately global, public goods (of which eradication, elimination, and control are just one example). In order to address this question, proponents of mass vaccination need to strengthen understanding of vaccination beyond the biotechnical, financial, and operational. There is a pressing need to understand better the global conditions of social development, the specific and complex socio-political environments in individual countries, and the specific political interactions that different kinds of disease, their different epidemiological characteristics, and the different forms of vaccine delivery and vaccination, necessitate and allow.

Notes

1. All immunisation programmes deal with large cohorts within the population. 'Mass immunisation programmes' here refers primarily to large-scale, often time – and coverage target-bound actions which, whilst not precluding a role for clinic – or fixed post-vaccine delivery, include prominently house-to-house operations, and are, thus, distinct from routine immunisation services.
2. Seven, if you include the hookworm campaigns from 1909.
3. 'Refractory' behaviour of target populations (and vector) in the case of malaria; dependence on 'behaviour change' in target populations in the case of yaws; reduced political commitment, in the case of yellow fever, in the Americas region following

significant reduction in the threat of urban epidemics and evidence suggesting negligible risk in that region of jungle-urban cross-transmission.

4. They are: 'cooperation of those sovereign states with the disease'; adequate technical personnel; and adequate finance (Hinman 1999).

5. 'An effective central and peripheral system of government is essential for the execution of an eradication programme. Political stability (not necessarily of a particular government, but of the overall political system) is a closely related requirement' (Yekutiel 1980). There are cases that controvert this – Sudan, for example. But aside from cases where government has collapsed or fragmented through overt conflict, failure to take into account ostensibly peaceful, but fragile, states (fractured characteristically between centre and regions or central and local administrative levels) places programmes requiring a coherent national response (such as eradication) in some degree of jeopardy.

6. The size of effective resistance may be disputed; recent evidence from the UK with regard to the epidemiological impact of the refusal of extremely small groups of parents refusing Measles Mumps & Rubella (MMR) vaccination makes a strong case in favour of taking small group activism in this field seriously.

7. Over 100 years, thus, eventuating 35 million infections – a significant number in its own right, but still at or less than one-tenth of smallpox's toll.

8. Paradoxically, increasingly so as the programme's success reduces numbers of cases to virtual social invisibility, whilst simultaneously ramping up (highly publicly visible) vaccination campaigns (and their associated costs) in order to reach the final, inaccessible or unavailable, population sub-groups.

9. Although the ultimate selection of smallpox as the target for eradication conceals what are reported to have been bitter contests within the World Health Organisation, reflecting wider political and Cold War tensions, in particular with respect to the possible candidacy of malaria.

10. The author was a member of the Technical Advisory Group for Social Mobilisation and Communication, PEI, Abuja, 23–30 June, 2007.

11. Dr William Foege (former Chief of the CDC Smallpox Eradication Program) (2007) Personal communication. There is considerable debate around the length of immunity offered by smallpox vaccination at the time of the eradication campaign. The lowest estimates appear to be around 10 years, though other studies suggest a longer timeframe (see, e.g., Hammarlund *et al.* 2003).

12. See Henderson (1998b).

13. There is an increasingly rich historical literature on the relations – and contests – between states and populations over vaccination. From the smallpox riots in the early nineteenth century, through the experiences of criminalising vaccine refusal in the early part of the twentieth century, to the pertussis scare of 1974, and the much more recent, and ongoing, MMR 'controversy', there is persistent evidence of highly rational behaviour on the part of many vaccine 'resistors'. Ignoring that rationality, especially as it gains increasing volume via traditional and new media, is something public health policy-makers and managers do at their peril. See, for example, Bhattacharya (2004), Durbach (2005) and Colgrove (2006).

14. For an excellent discussion of militarised enforcement in the latter stages of the SEP in India, see Greenough (1995).

15. It is interesting to compare this scale of intervention with comments from the *Report of the Committee of Inquiry into the Smallpox Outbreak in London, March–April 1973*: 'Despite the formidable powers available to the Medical Officer of Health it seems that he ... cannot compel vaccination ... cannot always compel isolation ... has not power to restrict the activity of a contact ... and cannot compel a healthy contact to submit to daily surveillance' (United Kingdom Parliament 1974).

16. Gwatkin *et al.* (2005) and others have demonstrated the correlation between lower socio-economic status and poorer access to health services. Perceptions and conditions of relative exclusion from such services are increasingly understood as underlying issues in non-compliance with polio vaccination. See, for example, Clements *et al.* (2006) How Vaccine Safety can Become Political – The Example of Polio in Nigeria, *Current Drug Safety* (2006). Yahya (2007) Polio Vaccines – 'No Thank You!': barriers to polio

eradication in northern Nigeria, *African Affairs*, 106/423, 185–204. Also, UNICEF (n.d.).
A revised PEI policy developed by UNICEF India after 2004, focusing explicitly on 'the
underserved', also reflects the recognition of a relationship between vaccine resistance and
social marginalisation, http://www.unicef.org/india/health_ 2876.htm

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