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Considering the “public” in public health: popular resistance to the Smallpox Eradication Programme in India

LUKE JURAN, JENNIFER TRIVEDI, KORINE N KOLIVRAS

Abstract

Public health initiatives, including large-scale vaccination and disease eradication programmes, regularly pit the rights of the individual against broader benefits to society. At times, the public resists such initiatives, with the World Health Organisation’s Smallpox Eradication Programme (SEP) in India being a case in point. Here, we critically investigate resistance to smallpox vaccines in India and argue that while the SEP successfully eradicated a global killer; individuals were stripped of human rights through coercion, forcible vaccination and quarantine. In many cases, resistance to vaccination was linked to deep-rooted social, cultural and religious beliefs. Critical points made in this

paper are applicable to contemporary discussions on required vaccinations, quarantine during the outbreak of diseases and the current campaign to eradicate polio.

Introduction

Public health is concerned with improving and protecting the health of an entire population, typically defined by political boundaries. However, some have argued that public health actors and programmes, while advocating for the public, have theoretically and pragmatically subjugated the individual in the name of collective well-being (1–3). Due to the broad scope of public health, it is contended that it is impossible for its measures to be universally welcomed by an entire population. Therefore, the targets of public health measures may find their personal sovereignties – whether moral, physical, religious or spiritual – cast aside in the name of the greater good. This real or perceived stripping of liberties, though generally benign and benevolent in nature, has sometimes backfired and (re)emerged in the form of popular resistance (4–6)¹.

To demonstrate this contention, we employ examples from the Smallpox Eradication Programme (SEP) of the World Health Organisation (WHO) as it played out in India. Our intention is neither to discredit, nor devalue the historic process that

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eradicated a global killer—the only currently eradicated infectious disease. Rather, our objective is to explore the age-old question of *how* monumental things are accomplished. While the historic achievement of smallpox eradication must be celebrated, a triumph of such magnitude should not be shelved without examining bioethical impediments to its success and the ways in which obstacles, in this case public resistance, were considered. In applying this approach, we investigate the theoretical and pragmatic rationale for opposition to mandatory vaccination measures such as those implemented in the WHO's SEP. Next, we provide critical accounts of popular resistance to the SEP in India. This examination of how smallpox eradication was accomplished allows one to identify why resistance transpired, which provides context for opposition to large-scale vaccination and public health programmes today. Thus, while the focus is smallpox vaccination in India, the paper is relevant to other public health challenges (eg polio, Ebola, cleft lip/palate), other public health measures (eg quarantine, large-scale provision of latrines, vector control), and other geographies (eg Pakistan, Nigeria, the United States).

The big picture

Setting the stage

It is useful to first provide a background on smallpox and the processes that led to the WHO's global eradication campaign. Smallpox infection is caused by exposure to the *Variola major* or *Variola minor* virus through direct person-to-person contact or contact with bodily fluids. The symptoms typically appear after a latency period of one to two weeks (7). A raised rash (which aided in the identification of cases during the SEP) is the most obvious symptom. The rash also indicates when an individual is the most contagious. Prior to the development of a vaccine, variolation was commonly used to inoculate uninfected persons with material from smallpox pustules.² This approach resulted from the work of Edward Jenner, who found that inoculation with cowpox conferred immunity to smallpox (8). The first vaccine was developed by Jenner in 1796 and, riding the wave of scientific optimism of the 1950s, public health officials promoted smallpox vaccination and were able to achieve eradication in most industrialised countries.

In 1967, the WHO initiated a global smallpox eradication campaign (ie the SEP), and the outcome was successful. The last known indigenous smallpox case was identified and treated in Merca, Somalia in 1977, making smallpox the only human disease to have been eradicated at present (9). It is estimated that 1.5–2 million lives and \$1.35 billion are saved annually as a result of the \$100-million SEP, the estimated benefit–cost ratio being 450:1 (10: p 684). To a great extent, what made eradication possible is that the symptoms manifested within a certain time frame and were easily identifiable with no need for laboratory tests; there were no asymptomatic carriers and thus no carrier state; and the vaccine was both effective and available in a formula that was not heat-sensitive. These conditions are not met in the case of many other diseases.

While the eradication of smallpox was a goal of the international community and the Indian bureaucracy, it would be erroneous to assume that it was the only major issue being confronted by India and the South Asian region. For example, politically, India and its neighbours were managing post-independence issues of governance, nation-building and border disputes, while establishing foreign relations. In terms of development, true to the Nehruvian legacy, technocratic undertakings, such as the construction of dams and the electrification of rural and urban India, were in progress. Finally, in terms of health, exposure to cyclones (and other disasters), a recent famine, taking advantage of the Green Revolution, and establishing piped water supplies were at the forefront. Thus, while this paper focuses on the eradication of smallpox in India, it does not do so myopically and instead recognises that India was confronting myriad parallel and competing issues, each of which could be considered equally pressing.

Theoretical and historiographical context

Resistance to the SEP in India must be framed within a much larger discourse. For purposes of this paper, opposition to vaccinations can be better understood through a social history of medicine perspective that examines how health technologies are perceived and adopted by society. As argued by Jordanova (11), the history of medicine is akin to the history of technology, and these two histories intersect when populations experience medicine first-hand through social–technological interactions with health practitioners. The social history of medicine serves to illustrate health technologies and the social processes that spawn them as distinct lived experiences that naturally include various social, cultural, religious and political perceptions and influences. Through the investigation of lived experiences, the social history of medicine has been used to describe the very different histories that have been created from the confluence of health technologies and the diverse peoples upon whom they are applied (12–14).

This paper must not be filtered through a temporally, spatially or developmentally reductive lens. Cases of vaccine resistance should instead be situated as existing across time, space and level of development, as evidenced by the breadth of historical and contemporary cases spanning both the global South and North. For example, there exists documented resistance to: smallpox vaccination in 19th-century England (15,16); smallpox vaccination in colonial India (17,18); the SEP in countries other than India (19,20); polio vaccination in the USA (4,21); polio vaccination in contemporary Nigeria, Pakistan and Afghanistan (22,23); and vaccines in general by religious minorities in the USA (eg Quakers and some Anabaptist sects of Amish, Hutterites and Mennonites, who are often granted the right to forego vaccinations).

Further, there have been many recent flare-ups regarding vaccinations and medical treatment in the USA, which underscores the continued relevance of such research beyond India and beyond the global South. In 2007, former Texas governor Rick Perry was criticised for an executive order

directing all girls to receive the HPV (human papillomavirus) vaccine before entering grade six. Critics argued that the order trampled on individual and parental rights, cited potential health risks of the vaccine, and questioned Perry's ties to vaccine producer Merck. Further, recent US presidential candidates Rand Paul and Chris Christie both acknowledged the importance of vaccines, but hedged their statements by claiming that freedom of choice in the matter was also critical, while President Donald Trump linked vaccines to autism in Republican debates and on Twitter. The false fear that vaccines may cause autism is a concept introduced by Andrew Wakefield's controversial, now discredited paper linking MMR (measles, mumps and rubella) vaccinations to autism (24). Despite the fact that Wakefield's article has been retracted, the vaccine-autism link remains in the public discourse and has driven resistance to vaccinations and related disease outbreaks. In 2015, a measles outbreak that began at Disneyland and spread to multiple locations was linked to efforts to resist vaccines in the USA. Many of the patients were widely reported by the media as being unvaccinated, either due to age (too young to receive the vaccine) or refusal to vaccinate. This resulted in Disney asking employees, but not visitors to the park, to stay home or provide proof of vaccination.

Similarly, the recent quarantining of Ebola cases – a controversial yet widely used tactic during the SEP – triggered widespread debates about patients' individual rights *vis-à-vis* legitimate fears regarding public safety, as well as discussions on whether quarantining would or would not help mitigate the spread of the disease. International calls were made by government officials, media outlets and the general public, demanding that potential Ebola cases be quarantined for 21 days (the incubation period of the disease) or longer. Some went further, demanding that such quarantine measures be put into effect for all travellers departing from Africa. Adding to these debates was the fact that medical and burial responders in West Africa were confronting their own forms of cultural, religious, and political resistance when attempting to quarantine infected patients and their bodily remains (25,26). Thus, the temporal, spatial and developmental extent of these cases demonstrates that critical investigations of vaccine resistance are constructive not only from a historical perspective, but from a contemporary, cross-cultural perspective as well.

Understanding resistance to vaccines and the SEP in India

Human rights and individual liberties

The establishment and expectation of inalienable rights and convictions related to them can be applied to resist vaccines. For example, the United Nations' Universal Declaration of Human Rights (27) – beyond Rawlsian understandings and rights codified in the constitutions of India and most nations – establishes basic liberties that should be guaranteed to all people, in all places and at all times; hence their universality. Proclaimed in the landmark document are rights to "freedom

of movement" (27: Article 13.1), "freedom of thought, conscience and religion" (27: Article 18), and the authority to exercise such rights in "public or private," "either alone or in community with others," and both in "observance" and "practice" (27: Article 18). We cite these specific rights as they will surface as factors of resistance in accounts narrated later. Note that we are not using the Universal Declaration of Human Rights as a template to work from. Rather, we simply deem it appropriate to orient readers with a broad, recognised document on rights so that they can better understand why people may elect to resist a programme such as the SEP.

Democracy, corporal colonisation and martial law

The very idea of a compulsory public health campaign (eg the SEP in India) is inherently undemocratic. Compulsory vaccination can be perceived as a Leviathan-esque "colonisation of the body" that clashes both with classical (eg Locke and Rousseau) and contemporary ideals (28, 29) of democracy. For example, speaking on the SEP in India, Naraindas (30) argues that compulsory public health programmes necessarily render the masses "inert" and "subservient" to the will and authority of the state. Thus, it is no surprise that obligatory measures instituted by the government and external agencies often foment scepticism, apprehension and ultimately resistance; the SEP was no exception. The implementation of the SEP was never democratically debated within the Indian state. Thus, civilians were subjected to the will of not only the state, but also that of an outside entity (ie the WHO) and scores of foreign bureaucrats, physicians and epidemiologists. Further, the compulsory nature of the SEP meant that all people must be vaccinated, even if they had been previously vaccinated and could exhibit a scar as evidentiary proof (31). It is in this context that the concept of compulsory, non-democratically debated vaccination processes can be seen as a dictatorial colonisation of the body.

Greenough discusses how "armies" of vaccinators swept through Indian villages in the middle of the night, and goes on to describe the SEP's convoys of "force-massed policemen and jeeps" (31: p 225). Supplementing these panoptic measures were systematic house-by-house searches for smallpox cases, and WHO rhetoric, in which a portion of the SEP was termed the "attack phase"; the mission was "search and destroy"; each case was treated as an "absolute emergency"; "surveillance-containment" was the method; and guards were deployed for manpower (32–34). It was language and actions such as these that permit scholars to characterise the SEP's focal-ring containment strategy as a "military-style operation" (31), with Bhattacharya et al claiming: "The concepts of 'state power', 'intimidation' and 'coercion' need to be put into context to understand the far-reaching, and often culturally invasive, effects of the SEP on a linguistically and culturally heterogeneous society" (35: p 50). Given this virtual martial law, pausing of democracy and colonisation of the body, it is not alarming that public opposition surfaced during the SEP in India.³

Mobility and quarantine

Restrictions on mobility through the SEP's focal-ring containment strategy can also be viewed from the perspective of resistance, or better yet, as a method instrumentalised by vaccinators to surmount resistance. The eradication of smallpox was initially attempted using the method of large-scale, mass vaccination. However, after marked but limited progress, the WHO switched to a surveillance–containment strategy in which cases of smallpox were identified, entire villages were cordoned and everybody was forcibly vaccinated. Thus, when cases were identified, the infected individuals were quarantined in their homes (with guards outside), or placed in secure isolation hospitals; meanwhile, the village was cordoned and the rest of its population was vaccinated (36,37). In this manner, not only were cases subjected to house arrest, but the mobility of the entire village was restricted through a *cordon sanitaire*, which prohibited entry into and exit from the village for a specified period of time. Conditions are ripe for the emergence of popular resistance when freedom of movement is restricted, not the least when it hinders means of livelihood and the generation of income.

Further rationale for resisting vaccines and the SEP

As discussed above, resistance to vaccines can arise for many reasons: in the context of human rights, the undemocratic–colonial–martial notions underlying a compulsory programme, and restrictions of mobility through an imposed focal-ring containment strategy. These reasons are supplemented by a battery of additional factors: suspicion and distrust of the state; anxiety regarding vaccine-related morbidity and mortality; bad memories of a previous vaccination campaign; fear of new or unknown technologies/scientific advances; and superstition, ignorance, apathy, etc. Still other justifications include religious beliefs, pregnancy, protection of infants, and fear of pain (from the lancet or needle).

Accounts of popular resistance to the SEP in India

Equipped with a non-exhaustive framework for understanding opposition to vaccination programmes, it is now our task to narrate actual accounts of popular resistance to the SEP in India. Resistance to the SEP ranged from passive concealment of cases to eruptions of physical violence and outright counterattack. However, the WHO's official histories of the SEP boldly claim that "vaccination acceptance is [was] good" (38: p 727), and that resistance in India was "a limited phenomenon" that did not leverage "substantial influence on the programme" (39: p 114). Further, Bazin (40: p 170) contends that there were "no religious or moral problems in its [smallpox] prevention." While the authors may be right in asserting that resistance to the SEP in India was not necessarily widespread, resistance did affect the implementation of the SEP and its role should not be downplayed. Thus, rather than sweeping acts of opposition under the rug, we seek to bring them to light in order to glean knowledge that is useful for future vaccine and public health programmes in India, Asia and elsewhere. Again, our goal is to analyse the SEP to better understand *how* a milestone of such scope was achieved in practice.

Religious bases for resistance constituted a primary form of opposition to the SEP in India. In fact, the WHO itself refutes Bazin's (patently false) claim that the eradication programme faced no religious barriers, explicitly stating that individuals deliberately concealed cases and evaded vaccinators on the basis of religious objections. The WHO stated that resistance often surfaced among "female members of strict Muslim families," sometimes making it "impossible for a male vaccinator to vaccinate" or "[even] to examine a female suspected smallpox case in these families" (39: pp 112–113). Hinduism, the predominant religion in India, was also a source of resistance. Hindus have historically followed a system of social, economic and spiritual stratification, known as the *varna* system, or caste system. Under the strictures of this system, some would consent to vaccination only by individuals from their own caste. Thus, friction arose due to caste mismatches among vaccinators and vaccine targets.

In some cases, programmes have utilised strategies under which religious leaders are coerced to proclaim the safety and benevolence of a public health measure to obtain the consent of a group, smallpox vaccination being a case in point. In the WHO's official text on the SEP in India, Basu et al (39) state that many tribal and minority groups accepted vaccination only when directed to do so by their chiefs, leaders or religious figures. Thus, the consent of local leaders was often the key to gaining the consent of villages. Further, in its authoritative post-eradication text, the WHO recounts an outbreak of smallpox at a Jain pilgrimage in Puri (in the state of Odisha) in which: "A special appeal was made to the principal religious leader, who agreed, reluctantly, to recommend vaccination. The entire village was quarantined by the Bihar military police." (38: p 782) Dr Mahendra Dutta, a WHO vaccinator present at the pilgrimage, claims that many pilgrims refused to be vaccinated until the SEP eventually "won the cooperation," having "persuaded [the pilgrims] to submit to vaccination through their religious head" (41: p 429). The use of religious leaders to endorse vaccinations reflects the existence of religious resistance to vaccinations. The stature of local religious and faith-based leaders makes them critical to the achievement of vaccination goals. With them (through coercion or genuine support), vaccination programmes may be more successful; without them, vaccination efforts may very well face additional resistance.

A fascinating example of religious resistance is situated within the Hindu pantheon. Hindu beliefs across South Asia, particularly in India and its state of West Bengal, attribute the smallpox virus to the goddess Sitala. When worshipped properly, she is peaceable, but when crossed she unleashes fever, pustules and pox (42, 43). Thus, by ignoring or challenging Sitala's will, devotees risk incurring her divine wrath, with the result being that "some persons resisted vaccination, fearing that it would anger the goddess" (38: p 715). The Centers for Disease Control and Prevention's (CDC) history of smallpox eradication describes opposition stemming from belief in Sitala as the "most colorful" form of resistance encountered by vaccinators in India (44: p 100). An example of

this unique composite of smallpox, religion and resistance may be found in Marsh Kieselstein's first-hand account of *adivasis* (tribal or aboriginal population) in Bihar:

[T]he Adivasis refused vaccination on religious grounds. They believed that smallpox is caused by the wrath of the goddess "Sitala Mata" and that the way to prevent, as well as cure, smallpox is by Puja, or prayer meeting. At the Puja, the priest builds a smoky fire and as the house fills with smoke, prayers are recited to drive away the evil. At the end of the prayer recitation, a chicken or goat is slaughtered and everyone leaves the Puja site without looking back. In order to protect themselves from infection, people burn sandalwood or ghee (fat), producing a scent which drives away the ghosts. The smallpox patient is worshipped by the flowerman or the most religious person of the family, as it is believed that the goddess resides within the patient. In order to drive smallpox away, anything that remains after worship is put in an earthen pot and thrown out of the village. . . . But the most noteworthy restriction is that treatment and vaccination are strictly prohibited as they may displease the goddess. (36: pp 73–74)

This primary account reveals that, in the *adivasis'* eyes, vaccination might well offend Sitala. Kieselstein uses the account to buttress his contention that religious "superstitions" constituted a formidable source of resistance and one of the most significant "obstacles to the success" of the SEP in India (36: p 73). He then goes on to relate another instance of Sitala-based opposition in the southern state of Tamil Nadu:

[S]ome 15 miles from the Christian Medical Center at Vellore (90 miles west of Madras), we discovered a smallpox patient in a small Hindu temple on the outskirts of the village. The man was completely covered with pustules and obviously delirious with fever. When we asked some of the village elders why this had not been reported to the health authorities, they answered that since smallpox was a punishment from the gods, the best place for the patient was in the temple. They wanted no part of vaccination and insisted that the Pujas they performed would be sufficient. (36: p 74)

This first-hand account ends with the infected individual being smeared with paste from a neem tree for curative and symptom-reducing purposes. The incident is a great example of how some Hindu priests dismissed (allopathic) vaccination and insisted on their own cultural-religious remedies (see *Ayurveda* and *Unani*). Interestingly, in order to surmount this form of resistance, the WHO decided to popularise slogans such as, "Worship the goddess, but to please her take vaccination."

The most dramatic case of religious resistance to smallpox vaccination comes from Lawrence Brilliant, a WHO physician-epidemiologist on the ground in a tribal region of Jharkhand. Brilliant narrates an episode in which Mohan Singh and his family were vaccinated against their will:

In the middle of the night, an intruder burst through the door of the simple adobe hut. He was a government vaccinator, under orders to break resistance against smallpox vaccination.

Lakshmi Singh awoke, screaming, and scrambled to hide herself. Her husband leaped out of bed, grabbed an axe, and chased the intruder into the courtyard. Outside, a squad of doctors and policemen quickly overpowered Mohan Singh. The instant he was pinned to the ground, a second vaccinator jabbed smallpox vaccine into his arm. Mohan Singh, a wiry 40-year-old leader of the Ho tribe, squirmed away from the needle, causing the vaccination site to bleed. The government team held him until they had injected enough vaccine; then they seized his wife. Pausing only to suck out some vaccine, Mohan Singh pulled a bamboo pole from the roof and attacked the strangers holding his wife. While two policemen rebuffed him, the rest of the team overpowered the whole family and vaccinated each in turn. Lakshmi Singh bit deep into one doctor's hand, but to no avail. (45: p 637)

Why was Singh so determined not to be vaccinated? The reason was rooted in his *dharma* (righteousness, moral duty, or what people must or must not do), as conveyed by Singh in a public speech delivered to the medical team and fellow villagers:

My dharma is to surrender to God's will. Only God can decide who gets sickness and who does not. It is my duty to resist your needles. We must resist your needles. We would die resisting if that is necessary. My family and I have not yielded. We have done our duty. We can be proud of having been firm in our faith. It is not a sin to be overpowered by so many strangers in the middle of the night. Daily you have come to me and told me it is your dharma to prevent this disease with your needles. We have sent you away. Tonight you have broken my door and used force. You say you act in accordance with your duty. I have acted according to mine. It is over. God will decide. (45: p 637)

For Singh, resistance to smallpox was rooted in religion and fatalism. Singh's philosophical paradigm holds that it is unjust to impose ones *dharma* on others; disease is God's territory, and only God can propagate and mitigate disease. Ultimately, judgment will ensue and one *dharma* – Singh's or the vaccinator's – will triumph over the other. This example upholds Greenough's contention that many felt that the SEP was being "jammed down the throats of Indian tribals and peasants" (31: p 225), and they did not want to submit to health on someone else's terms.

The altercation between Singh and Brilliant is an example of physical, more combative resistance to the SEP in India. In many instances, opposition in the form of running, hiding and striking vaccinators was documented (although violent resistance was admittedly rare). WHO vaccinator S.I. Music candidly acknowledges that in India, "women and children were often pulled out from under beds, from behind doors, from within latrines, etc. People were chased and, when caught, vaccinated. . . . When they locked their doors, we broke down their doors and vaccinated them" (31: p 207). Further, the WHO has made public an incident that took place in Bihar in which a mother and child attempted to remain undetected by the vaccinators' needles:

The patient and his mother left Painathi on March 29, two days before containment began. The mother was enumerated but the existence of a child was not made known. They returned on 14 April, but their presence was concealed by the father. Searchers went daily to each house in the village to vaccinate and to inquire about fever and rash. Dr Khan and Dr Briedert personally visited this house to find out if all the vaccinations were successful and if this woman had returned. The father of the child, however, lied to them.

The family had been resistant and uncooperative from the start. After enumeration, vaccination was possible only when we climbed over the compound walls and forcibly inoculated each family member. After a rumour reached Dr Khan, who had been staying in the village, he had to use a trick to gain entrance to the house. He asked for a glass of water and this was denied. He knew by custom that they had a case of smallpox inside the house because nothing can be given when a case of smallpox is in the house of a member of this religious sect.

Dr Briedert is now staying inside the infected house. . . . The mother was vaccinated on 2 May. . . . We are nonetheless isolating her and keeping her under close observation for the next 14 days. (38: p 783)

Thus, not only did targets of vaccination attempt to remain physically unnoticed, some were deceitful and refused to cooperate from the very beginning. In this case, resistance was countered by posting an in-home guard for one fortnight. The use of guards in such vaccine-related conflicts can be unnerving to the nearby residents. These sentiments are warranted, as Naraindas speaks of an incident in which a *mohalla* (village or district of a city) refused to surrender to vaccination and so, according to the vaccinator, "we [SEP vaccination team] threw a barbed wire fence around them, posted guards for six weeks, and allowed the disease to smoulder and die" (41: p 450).

Perhaps the most violent incident of resistance to the SEP in India was encountered by WHO vaccinator T. Stephen Jones, who forcibly vaccinated a "chubby, somewhat effeminate man" in Bihar (46: p 638). After unwillingly receiving the vaccine, the individual concocted a story that the men in the vaccination team were robbers. Later, the vaccinators heard a commotion brewing outside. Sensing that they were in danger, the team went outside to face the mob:

[W]e went outside and there was a whole bunch of the villagers, and the story was . . . that we were reported to be robbers, thieves. And they began pushing my PMA [physician's medical assistant]. It was an aggressive crowd, no questions. There were 20 or 30 men with bamboo sticks, lathis. With a brass fitting on the end of the lathi. So they pushed him, and I set myself between him and the people who were pushing him, for that was my experience – that I was invulnerable. And then I felt dizzy. And then I sort of crumpled down on the ground and found that I had blood in my eyes and a laceration on the top of my scalp. (45: p 638)

Finally, resistance also arose from lack of respect for social norms. The failure to recognise and be sympathetic to local customs may backfire, as seen in the case of vaccinators who did not bother to consult with and show deference to elder populations:

Indian society is also patriarchal and offers great respect to the older experienced members of the community. It was to these people that the uneducated villager would turn for advice on whether to accept vaccination. Not infrequently, a young, aggressive vaccinator would fail to observe the courtesies and respect due to these older people, an action which provoked resentment and animosity, rather than cooperation. (39: p 113)

This case reveals two salient closing points. First, it demonstrates that resistance can be rooted in the social, cultural and religious beliefs of the target population. This is evident in the WHO's assertion that "difficulty lay among the tribal and minority groups. Proud of their own traditions, and often suspicious of the motives of the outside world..." (39: p 113). However, it also demonstrates that while many of the origins of cultural resistance are endogenous, some are triggered by culturally insensitive actions on behalf of the vaccinator or vaccination team. Second, this case (and other cases and arguments outlined in the paper) demonstrates that the authoritative histories of the WHO, among other texts (40), are false in claiming that resistance to the SEP in India failed to rise to a level of pragmatic, programmatic and human rights consideration. It is merely the public within public health that we seek to consider. The perceptions and reactions of the diverse public can not only help us to understand how public health milestones are achieved, but how to move forward with public health measures in a manner that is more culturally sensitive and based on human rights.

Conclusion

Popular resistance to the SEP and public health programmes in general is understandable and perhaps to be expected. Resistance does not equate to an indictment of large-scale public health programmes. Rather, it signals that a more sympathetic approach – combined with the application of the lessons learned – should be adopted to reduce future friction among stakeholders. Cases of opposition are understandable when one pauses to consider the many rationale for resistance, whether an epistemology of culture, religion, personal liberties, or reasons that cannot be fully expressed or understood. It must be reiterated that we do not intend to discredit or devalue the eradication of smallpox, nor demonise SEP vaccinators. In fact, many of the accounts cited above culminate with the vaccinator expressing remorse for resorting to coercive and intimidating actions (although this stopped short of regret since vaccinators believed that they were engaged in a worthy humanitarian crusade). Further, the vaccinators themselves undoubtedly confronted personal health and security risks while vanquishing a deadly pandemic. This cannot be underestimated as it represents a present source of concern among polio vaccinators in Pakistan and

Afghanistan as well as responders to medical crises such as the Ebola outbreak in West Africa.

The eradication of smallpox should be viewed as a milestone for biomedicine, public health, India and the world. We have been freed from the shackles of a fatal virus and that is a commendable achievement. However, one has a moral duty to examine historical milestones in order to understand how they were achieved. Through this critical lens, we argue that it is rare, if not impossible, for an accomplishment of such magnitude to be realised without eliciting elements of distrust or outright resistance in the target population. The global eradication of smallpox was no exception. While opposition to the SEP in India may not have materialized at a large scale, its role should not be downplayed – it should instead be harnessed as knowledge to avoid a repetition of past mistakes.

After considering the WHO's official narrative on the SEP in India (coupled with primary accounts and theoretical rationale for mounting resistance), we argue that it is valuable to critically evaluate how and why vaccine resistance manifests. This begins by employing Bhattacharya's casting of the SEP as a complex process:

[The official literature] suggests that India's freedom from smallpox had been accomplished with relative ease as a result of concerted collaboration between the country's central government and the WHO. The problems encountered during the push for eradication are represented merely as temporary setbacks, quickly overcome through the efforts of a committed national government and generous technical and financial assistance from the WHO. The impression generally given is one of a united front, certain of its methods and assured of its success. The reality was far more complex. (46: pp 163–164)

The SEP in India was overlaid on a diverse social, cultural and geographical context.⁴ This milieu, along with perceptions that the campaign was being “jammed down the throat”, ultimately fashioned an interface for resistance. Portions of society were simply reluctant to be healthy on someone else's terms, and public health professionals should bear this in mind in the implementation of current and future programmes. This is particularly relevant to the ongoing campaign to eradicate polio, which is encountering its own forms of cultural, religious and political resistance.⁵

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Notes:

- ¹ In this paper, popular resistance is defined as opposition to the Smallpox Eradication Programme (SEP) by individuals, families or groups of the Indian public. It does not imply massive, widespread public demonstrations, which were rare. See Foster (47) for cases of active public participation in campaigns to eradicate smallpox.
- ² Indians had developed and practised a method for variolating for smallpox prior to the SEP; however, this paper will not discuss the indigenous Indian practice of variolation.
- ³ It should be mentioned that disease prevention through elaborate military-style exercises became a model for malaria control in India,

where it failed spectacularly. The approach damaged the development of health services in the country and was replaced with approaches focusing more on participation, community engagement and the dissemination of information (48,49).

- ⁴ See Bhattacharya (50) for a review of the geographical and environmental factors that affected the SEP in India.
- ⁵ While efforts to eradicate polio have been effective (reduction in cases from 350,000 in 1988 to 72 in 2015), the process has not been without challenges (51). As recently as January 2016, a polio vaccination clinic was the target of a suicide bomber in Quetta, Pakistan (52). Reports linking polio vaccination resistance to religion, more specifically Islam, are justified, although that may be oversimplifying the issue. Bhattacharya and Dasgupta (53) argue that the situation is complex, and resistance appears, in some areas at least, to be related to socioeconomic differences and the use of vaccination as a bargaining tool for local development projects.

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