

EDITORIAL

Mandatory universal vaccination in a pandemic is a civic responsibility

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After Edward Jenner's breakthrough of 1796 in showing that inoculating someone with cowpox prevented smallpox, the decline of the variola virus began. However, it took two centuries for the world to arrive at the World Health Organization (WHO) declaration in 1979 that smallpox had been eradicated. Its spread was significantly related to global population growth and the movement of people across regions and continents, and dates back to 3,000 to 4,000 year ago [1]. The dilemmas of vaccination against smallpox, from Jenner until its eradication, were like those seen today with the vaccination against the severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2).

Widespread vaccinations began in the early 1800s, and the United Kingdom (UK) Vaccination Act of 1840 provided free vaccinations for the poor. Thereafter, the Vaccination Act of 1853 made vaccination compulsory for all infants in the first 3 months of life and made defaulting parents liable to a fine or imprisonment [2]. The Act of 1867 extended the compulsory vaccination requirement to the age of 14, with cumulative penalties for non-compliance. Anti-vaccination resistance started after the 1853 Act, which spread across Europe and North America, and as a consequence, a new UK Vaccination Act was passed in 1898 which removed cumulative penalties and introduced the concept of the 'conscientious objector' [2].

When the 1898 Act was amended in 1907 to stop people applying to magistrates to get exemptions, instead to make statutory declaration that the parents think that vaccination would be prejudicial to the health of the child, Henry Craik, a member of parliament wrote, *'The fruit of this folly no doubt will be a calamitous visitation of small-pox. A few years will see an enormous growth of populations unprotected from small-pox, and it is then that we shall be faced, according to all the teaching of experience, with the devastations of this terrible disease'* [3]. However prior to this, there was a groundswell of opposition to vaccinations by ordinary people because of complications, contrary advice from doctors. In over two decades from 1871 in Leicester, UK, over 6,000 parents were prosecuted, and fined or jailed for non-compliance [4].

As the UK reversed almost half a century of compulsion in smallpox vaccination, in the United States (US), after a major breakout of smallpox in Boston, the Supreme Court of the United States (SCOTUS) affirmed Massachusetts' compulsory vaccination laws in 1905, in *Jacobson v Massachusetts* [5]. The SCOTUS in upholding the right of the State to protect public health, based its judgement on the necessity of the case, use of reasonable means by the state, proportionality, and harm avoidance [5]. Justice Harlan wrote, *'But it is equally true that in every well-ordered society charged with the duty of conserving the safety of its members the rights of the individual in respect of his liberty may at times, under pressure of great dangers, be subjected to such restraint, to be enforced by reasonable regulations, as the safety of the general public may demand'* [6].

The Anti-Vaccination League was founded in London in 1853 after the Vaccination Act of 1853, and after the 1867 Act, it focussed on the infringement of personal liberty and choice [2]. Similar movement flourished in Europe, and in 1879, after a visit by a leading British anti-vaccinationist, the Anti-Vaccination Society of America was founded in the US [2]. Remarkably, the themes of anti-vaccination arguments in 1878 and 2001 were the same, vaccines cause idiopathic illnesses; poisonous chemical cocktails; cover up of truth in 1878 and of immune system failure in 2001; unholy alliance for profit; temporary immunity; ineffectiveness; and healthier lifestyle with diet and good hygiene as alternatives [2]. In the totalitarianism theme, in 1878, *'the vaccination law not only insults every subject of the realm, but it insults every human being...We must war against all despotism, injustice and tyranny wherever they exist'*, and in 2001, *'The Orwellian spectacle of monopolistic and oligopolistic pharmaceutical manufacturers subverting government agencies to ram unsafe products down children's veins is a violation of the basic principles of the Constitution and Bill of Rights'* [2].

It is within this historical endurance of the antithesis towards vaccination over two centuries, that one contextualises the immutability of anti-vaxxers. In our time, omnipresent social media has turned this antithesis into

a pandemic. In a review of coronavirus disease 2019 (Covid-19) vaccine-related items from social media including Facebook, Google, YouTube and Twitter, 91% of the 637 items identified were rumours and 9% were conspiracy theories from 52 countries [7]. Only 5% were true, 10% were misleading, 2% were exaggerated, and 83% were false. The themes and tones were similar to those of 1878 and 2001, but with a touch of modernity, ‘COVID-19 vaccine would contain a microchip through which biometric data could be collected, and large businesses could send signals to the chips using 5G network, controlling humanity’, and ‘...., vaccination against COVID-19 was intended to genetically modify humans’ [7]. And in the context of totalitarianism in 2021, a US army officer resigned after President Biden mandated compulsory Covid-19 vaccination for all US military service members. The Fort Bragg, North Carolina officer wrote, ‘First, and foremost, I am incapable of subjecting myself to the unlawful, unethical, immoral and tyrannical order to sit still and allow a serum to be injected into my flesh against my will and better judgement’.

The earliest substantive evidence of smallpox in Europe, the ‘Plague of Antonius’ epidemic, started in A.D 164 in Rome during the reign of Emperor Marcus Aurelius Antonius. It lasted for 15 years and claimed an estimated three to seven million lives [8]. Epidemics of smallpox continued to plague humankind intermittently, and in the last full century of the disease, the 20th century, an estimated 300 million people died of smallpox [9]. Just before Edward Jenner’s breakthrough of 1796, immunisation in the form of variolation, which had gone on since the middle ages in China [9], had an early champion in Empress Catherine the Great, The Empress of all the Russias, who in 1768 had variolation herself against smallpox [10]. The importance of Catherine the Great was her recognition of the importance of mass variolation of all Russians against smallpox in 1787, and this was against a sceptical medical community, and a clergy who railed against it, saying it was akin to ‘playing God’ [11].

Despite the opprobrium of almost two centuries, vaccination has been the most effective medical intervention ever introduced. It was the WHO strategic action plan, the Intensified Smallpox Eradication programme (1967–1980) which resulted in mass vaccination campaigns and the development of surveillance systems that led to the WHO declaring in 1979 that smallpox had been eradicated [1]. It is estimated that had vaccine not been available, an estimated 5 million people would have died every year, that is between 1980 and 2018, around 150 to 200 million lives have been saved [12]. Beyond smallpox, It was estimated that in just over 90 years from 1924 in the US, vaccines prevented 40 million cases of diphtheria, 35 million cases of measles, and a total of 103 million case of childhood diseases [9]. The global cases of measles in

1980 was over 4 million with about 10% vaccination rate, and by 2012 when the vaccination rate reached 90%, the cases of measles had dropped to about 157,000 [13]. What the control of communicable diseases by vaccination, antibiotics and sanitation meant was the improvement of life expectancy. In 1900 life expectancy in the US was 47.3 years, with communicable diseases being the leading cause of death, and by 2014, life expectancy had gone up to 78.7 years and non-communicable diseases were now the leading cause of death [9].

Beyond communicable diseases, vaccinations are used to prevent cancers. Vaccinations against hepatitis B and C in liver cancer, *Helicobacter pylori* in stomach, human papillomavirus in cervical cancer, and Epstein-Barr virus in Burkitt’s lymphoma and nasopharyngeal carcinoma [9]. There is a suggestion that beyond communicable diseases, several live vaccines reduce the incidence of all-cause mortality in vaccinated compared with unvaccinated population [14]. And with SARs-Cov-2 (Covid-19) has come the maturation of messenger RNA (mRNA) vaccines, and they are promising because of high potency, capacity for rapid development and quick alterations in cases of new variants [15].

For over two centuries, immunisation has become the most significant medical intervention in humankind. Immunisation has led to the eradication of smallpox, eradication of poliovirus (poliomyelitis) in all but two countries. It has brought about the reduction in infant and childhood mortality rates because of reduced incidences of communicable diseases, rubella, whooping cough, mumps, measles, cysticercosis, lymphatic filariasis. Immunisation has contributed to the near doubling of life expectancy worldwide in just over a century. These have happened with minimal complications from vaccinations.

Covid-19 has shown the devastation a pandemic has on our way of life, which has affected every member of society [16] — the disruption of school children’s education across 2 academic years, and the loss of small businesses from prolonged lockdown. Apart from loss of income and businesses in the working age group, the prolonged lockdown led to physiological deconditioning, loss of muscle mass, and fragility in the older age group. We had our freedom of movement curtailed, and those who crossed borders were quarantined in hotels at their own expense. It limited our religious freedom of associations, of communion in churches, mosques, synagogues, and other establishments. Weddings, naming ceremonies, Christmas, Eid al-Fitr, Passover, National Day of Reason, and funerals took place on Zoom. The usual frenzied air of friends, family and well-wishers on our hospital corridors was replaced by an eerie silence, as mothers had their babies alone or with one other, patients died without last goodbyes, and those that had

life-saving operations did so without the comforting warmth of family and friends.

Economies took a battering. The pandemic has cost the UK government about £315–410 billion, equivalent to £4,700 to £6,100 per household in the 2020/21 financial year [17]. It is estimated that the cumulative financial cost of the Covid-19 pandemic related to lost economic output and health reduction to the US is more than \$16 trillion, an estimated loss of nearly \$200,000 per family of 4 [18]. The lost output of the Great Depression of 1929 was only a quarter as large [18]. The taxpayers will largely foot these bills.

Twenty-one months after the WHO declared the outbreak of Covid-19 a pandemic in March 2020, 5.29 million people have died worldwide [19], and the elderly and those with co-existing medical conditions have borne the brunt [20]. Covid-19 has impacted on other aspects of healthcare also including life threatening diseases like cancer [21–23]. In low-income countries, managing Covid-19 patients meant resources were diverted away from musculoskeletal tumours in Nigeria [21], while in high-income countries, when elective work was stopped at the beginning of the pandemic, there was a decrease in screening for breast, colon and cervical cancers in Belgium [22]. In the UK between April and October 2020, there was a 22% relative reduction in the number of cases referred for treatment for colorectal cancer, that is, over 3,500 few people had been diagnosed and treated for colorectal cancer than would have been expected [23]. Overall, it was estimated that Covid-19 led to reduction of life expectancy in 2020 in most countries, with the highest reduction of 2.33 years in Russian men [24].

As Delta gives way to the Omicron variant of SARS-Cov-2 in late 2021, there is a renewed drive to fully vaccinate the population. For vaccination to be effective, there must be a critical mass of fully immunised people, and two centuries have taught us how critical this is. As shown above, Covid-19 has affected every member of the society, and in this context, vaccination is not, and never has been, about individual rights versus the greater good of the society. Vaccination is not the altruism of the unaffected individual who is asked to self-sacrifice to help more vulnerable members of the society. Vaccination is about being a good citizen, it is about sharing the collective burden, and it is about contributing equitably to the wellbeing of the society. Infectious diseases are communal diseases that need communal remedies.

Our attitudes to anti-vaccination advocacy are ante-diluvian, even though anti-vaccination advocacy has not evolved, nor has it ever been evidence based. For over two centuries, there has been recrudescence of the same themes dressed up in modern languages of the time, while stridently ignoring the positive strides and safety of vaccinations. None of the anti-vaccination advocacy

predictions have come true, and our civil rights have made rapid progress and continue to evolve. Anti-vaccination advocacy reinforces vaccine hesitancy while not offering effective alternatives, and it is a denial of history.

There is no longer a place for the conscientious objector, and refusal to be vaccinated is anti-social; it is anti-society. Individuals, or groups of people, cannot put themselves above others and opt out of communal remedies that tackle communal diseases that they will benefit from as well. Mandatory universal vaccination in pandemics and epidemics, is equitable and just, and it should be de rigueur. Vaccination is a civic responsibility.

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References

- Thèves C, Crubézy E, Biagini P. History of smallpox and its spread in human populations. *Microbiol Spectr* 2016 Aug 12; 4(4): PoH-0004-2014. doi: 10.1128/microbiolspec.PoH-0004-2014
- Wolfe RM, Sharp LK. Anti-vaccinationists past and present. *BMJ* 2002 Aug 24; 325(7361):430. doi: 10.1136/bmj.325.7361.430
- Craik H. The surreptitious abolition of compulsory vaccination. *Hospital* 1907; 43(1103): 98.
- Williamson S. Anti-vaccination leagues. *Arch Dis Child* 1984; 59(12): 1195–6. doi: 10.1136/adc.59.12.1195
- Gostin LO. Jacobson v Massachusetts at 100 years: police power and civil liberties in tension. *Am J Public Health* 2005 Apr; 95(4): 576–81. doi: 10.2105/AJPH.2004.055152
- Mariner WK, Annas GJ, Glantz LH. Jacobson v Massachusetts: it's not your great-great-grandfather's public health law. *Am J Public Health* 2005 Apr; 95(4): 581–90. doi: 10.2105/AJPH.2004.055160
- Islam MS, Kamal AHM, Kabir A, Southern DL, Khan SH, Murshid Hasan SM, et al. COVID-19 vaccine rumors and conspiracy theories: the need for cognitive inoculation against misinformation to improve vaccine adherence. *PLoS One* 2021 May 1; 16(5): e0251605. doi: 10.1371/journal.pone.0251605
- Hopkins DR. The greatest killer: smallpox in history [Internet]. 2nd ed. Chicago, IL: The University of Chicago Press; 2002. Available from: https://books.google.co.uk/books?hl=en&lr=&id=z2zMKsc1Sn0C&oi=fnd&pg=PR9&ots=-gYouOnth_&sig=bU1TdGmJGV8ASFTWeG0rnEzQ&redir_esc=y#v=onepage&q&f=false [4th December 2021].
- Rappuoli R, Pizza M, Del Giudice G, De Gregorio E. Vaccines, new opportunities for a new society. *Proc Natl Acad Sci U S A* 2014; 111(34): 12288–93. doi: 10.1073/pnas.1402981111
- Griffiths J. Doctor Thomas Dimsdale, and smallpox in Russia: the variolation of the empress Catherine the Great. *Bristol Med Chir J* 1984 Jan; 99(1): 14–6.
- Brockell G. Catherine the Great urged mass smallpox immunization in 1787 letter sold at auction. *The Washington Post* [Internet]; 2021. Available from: <https://www.washingtonpost.com/history/2021/12/01/catherine-the-great-immunization-smallpox/> [cited 5 December 2021].
- Hinman AR. Global progress in infectious disease control. *Vaccine* 1998 Jul 1; 16(11–12): 1116–21. doi: 10.1016/S0264-410X(98)80107-2

13. Greenwood B. The contribution of vaccination to global health: past, present and future. *Philos Trans R Soc B Biol Sci* 2014 Dec 2; 369(1645). doi: 10.1098/rstb.2013.0433 [5th December 2021]
14. Benn CS, Fisker AB, Rieckmann A, Sørup S, Aaby P. Vaccinology: time to change the paradigm? *Lancet Infect Dis* 2020 Oct 1; 20(10): e274–83. doi: 10.1016/S1473-3099(19)30742-X
15. Pardi N, Hogan MJ, Porter FW, Weissman D. mRNA vaccines – a new era in vaccinology. *Nat Rev Drug Discov* 2018 Mar 28; 17(4): 261–79. doi: 10.1038/nrd.2017.243
16. Smith J, Collier T, Dixon K, Adebunsiyi M, Sikabofori T, Cameron-Taylor M, et al. COVID-19 in 2020 – a look back from NHS frontline. *J Glob Med* 2021 May 18; 1(1): e27. doi: 10.51496/jogm.v1.27
17. Brien P, Keep M. Public spending during the Covid-19 pandemic [Internet]. London; 2021. Available from: <https://commonslibrary.parliament.uk/research-briefings/cbp-9309/> [5th December 2021]
18. Cutler DM, Summers LH. The COVID-19 pandemic and the \$16 trillion virus. *JAMA* 2020 Oct 20; 324(15): 1495–6. doi: 10.1001/jama.2020.19759
19. Dong E, Du H, Gardner L. An interactive web-based dashboard to track COVID-19 in real time. *Lancet Infect Dis* 2020 May 1; 20(5): 533–4. doi: 10.1016/S1473-3099(20)30120-1
20. Murphy SA, Khalil F, Fayaz M, Robinson L, Cummings NM. Mortality 30 and 90 days after hospitalisation for COVID-19: prognostic factors on admission to hospital. *J Glob Med* 2021 Apr 9; 1(1): e13. doi: 10.51496/jogm.v1.13
21. Idowu OK, Orji EI, Abudu A. Healthcare during the COVID-19 pandemic in resource-challenged countries – the Nigerian experience. *J Glob Med* 2021 Sep 15; 1(1): e25. doi: 10.51496/jogm.v1.25
22. De Pelsemaeker MC, Guiot Y, Vanderveken J, Galant C, Van Bockstal MR. The impact of the COVID-19 pandemic and the associated Belgian governmental measures on cancer screening, surgical pathology and cytopathology. *Pathobiology* 2021 Jan 1; 88(1): 46–55. doi: 10.1159/000509546
23. Morris EJA, Goldacre R, Spata E, Mafham M, Finan PJ, Shelton J, et al. Impact of the COVID-19 pandemic on the detection and management of colorectal cancer in England: a population-based study. *Lancet Gastroenterol Hepatol* 2021 Mar 1; 6(3): 199–208. doi: 10.1016/S2468-1253(21)00005-4
24. Islam N, Jdanov DA, Shkolnikov VM, Khunti K, Kawachi I, White M, et al. Effects of covid-19 pandemic on life expectancy and premature mortality in 2020: time series analysis in 37 countries. *BMJ* 2021 Nov 3; 375: e066768. doi: 10.1136/bmj-2021-066768

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