

Fig. 1 | Wild poliovirus cases reported in the first eight months in Pakistan and Afghanistan.

Data shown are for January to August, 2011–2021. Credit: Global Polio Eradication Initiative

in March 2020, to circumvent the potential spread of COVID-19, had left 50 million children unimmunized⁷. Although the polio vaccination campaign resumed in July 2020, the number of polio cases (WPV1 and cVDPV2) had reached 219 in Pakistan and 364 in Afghanistan by the end of 2020⁸, which accounted for 47.5% of all global polio cases last year.

Nevertheless, the emergence of 9 polio cases (1 WPV1, 8 cVDPV2) in Pakistan and 44 cases (1 WPV1, 43 cVDPV2) in Afghanistan between January and August 2021⁹ indicates a sharp decline, with most of the cases being vaccine-derived. With only two cases of WPV1 in both countries, 2021 is on

track to have the lowest toll of polio virus in a decade (Fig. 1). This reduction in polio may be attributed to efficient governmental interventions and improved awareness of vaccination among the general public.

Amidst the fourth wave of COVID-19 and the potential threat of the Delta variant, Pakistan has prioritized polio vaccination campaigns and more than 40 million children have received two doses of the polio vaccine in 2021⁹. By contrast, Afghanistan is struggling to continue their polio vaccination campaigns¹⁰; in part due to instability and the changing political dynamics of the country.

Vaccine hesitancy in Pakistan and Afghanistan has been a considerable problem for polio eradication in the past. The widespread coverage and administration of COVID-19 vaccines around the world has increased awareness about the lifesaving effects of vaccines, and this has had an effect on public awareness in polio endemic countries. There remains a need for booster doses of polio vaccines, especially in the tropics. There is also a need to implement GPEI's "the switch" strategy to phase out the oral polio vaccine in routine immunizations, which may reduce vaccine-derived polio cases by more than 90%. Nevertheless, COVID-19 vaccination centers remain an ideal setting to increase awareness of polio vaccines, to protect the lives of children, and finally move towards eradication.

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References

1. WHO. <https://www.who.int/news/item/10-06-2021-countries-reaffirm-commitment-to-ending-polio-at-launch-of-new-eradication-strategy> (accessed 11 August 2021).
2. Global Polio Eradication Initiative. <https://polioeradication.org/polio-today/polio-now/wild-poliovirus-list> (accessed 11 August 2021).
3. Ali, M. et al. *Lancet* **394**, 915–916 (2019).
4. Worldometer. <https://www.worldometers.info/coronavirus> (accessed 11 August 2021).
5. Ourworldindata. <https://ourworldindata.org/covid-vaccinations> (accessed 11 August 2021).
6. Centers for Disease Control and Prevention. <https://www.cdc.gov/globalhealth/measles/data/global-measles-outbreaks.html> (accessed 11 August 2021).
7. UNICEF. <https://www.unicef.org/press-releases/polio-vaccination-campaigns-resume-afghanistan-and-pakistan-after-covid-19> (accessed 11 August 2021).
8. Global Polio Eradication Initiative. <https://polioeradication.org/polio-today/polio-now/this-week> (accessed 11 August 2021).
9. Reliefweb. <https://reliefweb.int/report/pakistan/more-40-million-children-received-vaccination-during-nationwide-anti-polio> (accessed 11 August 2021).
10. WHO. <http://www.emro.who.int/afg/afghanistan-news/third-national-polio-immunization-campaign-begins-in-afghanistan.html> (accessed 11 August 2021).

Author contributions

M.A. was responsible for the concept, literature search and writing; J.K. and B.H.A. revised the letter; N.A., H.K. and A.I. helped in data collection; M.R. and M.A. helped in data analysis, interpretation and writing.

Competing interests

The authors declare no competing interests.



Health-based civic engagement is a professional responsibility

To the Editor — Since the 2020 US presidential election, there has been a nationwide assault on voting rights, with 18 states enacting 30 new laws that restrict voting access, and hundreds of similar bills marching through state legislatures¹. Recent restrictions draw comparisons with the literacy tests and poll taxes of the Jim Crow era. Indeed, much of this voter suppression is targeted toward Black people and Indigenous Americans and people of color, all of whom have long borne the violent burden of institutionalized racism and are

survivors of extensive, punitive disparities in all areas of life. Health professionals must champion patients' right to vote to protect health and deracinate inequitable medical practices, building on the efforts of organizations such as VotER and VoteHealth 2020.

The interdependency between voting and health, as well as the power of policy to address social determinants of health, underscore why civic-health promotion must become a professional responsibility for healthcare workers. From registering to

vote to attending neighborhood town halls to engaging government representatives, civic health refers to the ability of a community to come together and address public concerns. Civic health is a powerful indicator of overall health, with lower voting rates consistently associated with poorer health; for instance, patients with chronic illnesses are less likely to vote than healthy individuals². Civic and health engagement amplify and reciprocate one another, with longitudinal studies demonstrating bidirectional causal pathways.



Fig. 1 | The VotER healthy democracy kit. The image shows the VotER healthy democracy kit, including the lanyard and ID badge backer. Credit: Image taken with permission from VotER.

Voting also impacts community health because local elections determine how vital resources are made available, from healthy food to potential employment opportunities. In 2015, Louisiana's Governor John Edwards campaigned significantly on Medicaid expansion, and his election profoundly bolstered insurance enrolment rates and self-reported health among Black residents in the state³. As such, civic engagement in vulnerable, disadvantaged communities can contribute to the development of more equitable public policy.

Given that 80% of modifiable contributors to patient health are determined by nonmedical factors⁴, empowering patients to vote allows them to exert agency over their health. Voter registration of all patients, whether hospital patients, outpatients or people visiting their community health centers, offers the opportunity to address underlying political determinants of health, such as special interests, partisan ideologies and policy more broadly. Voter engagement also helps address long-standing, systemic inequities in medicine. One study found that almost 20 state-level elections from 1970–2004 may have had a different outcome if Black people of voting age had the same mortality profile as their white counterparts². Such health inequities silence underrepresented voices and are a challenge to democracy; thus, voting disparities must be addressed in tandem with health disparities. The medical community should reimagine health interactions such that questions like “do you smoke?” and “are you exercising?” are naturally accompanied by “are you

registered to vote?” Promoting patients' civic involvement will promote equity and their overall health.

Traditionally, the Department of Motor Vehicles has served as the primary venue for voter registration, but the National Voter Registration Act encourages nonpartisan voter education and registration activities within hospital settings as well. Given the frequency of hospital utilization among underserved communities and emergency departments' increasing role as safety nets⁵, healthcare settings are innovative locations to register people to vote. Indeed, hospitals have access to the groups least likely to be registered to vote (including younger adults, low-income individuals and Black and Indigenous people)⁶ and offer trusted messengers in a system in which trust is deeply frayed. Trust has been damaged over many decades of systemic racism, from denying Indigenous Americans the right to vote until the 1924 Snyder Act to the effective disenfranchisement of Black Americans with Jim Crow laws. Rebuilding trust in democratic systems will require healthcare workers, some of the most trusted professionals in society, to use their positions to advocate for civic engagement.

Over 300 hospitals and care organizations have sought to promote such voter access and advance healthcare-based voter registration through National Civic Health Month in August, hosting voter registration drives, displaying posters with voting resources and facilitating conversations among patients about civic engagement^{7,8}. One example is VotER, a nonpartisan nonprofit that helped over 46,000 patients

vote in the 2020 election through sending healthcare professionals Healthy Democracy kits. Each kit consists of a highly visible lanyard and badge backer with a QR code to scan or number to text so that patients can check their voter registration status and register to vote within minutes (Fig. 1). With “Ready to Vote?” or “Register to Vote Here” lining the badge-backer's side, patients' curiosity empowers healthcare workers to triage them to the VotER website, where patients can receive local voter registration information, text reminders on when and how to vote, and an option to speak with a voting rights expert at any time. Having delivered over 26,000 Healthy Democracy kits, VotER enables care professionals across all role groups and specialties to deconstruct the obstacle course that has long characterized voting in the United States and thereby include all patients in the democratic process.

The civic health movement includes countless other initiatives that seek to facilitate the civic engagement of patients. Democracy at Discharge, for instance, registers patients to vote as a part of their discharge instructions, alongside the treatment and follow-up plan. Another voter registration drive in Bronx hospitals saw clinic personnel engage patients during appointment registration, before the physician visit and in other waiting periods to educate them about New York voting laws and, if patients were interested and eligible, register them to vote. Eighty-nine percent of previously unregistered patients were registered to vote, demonstrating how clinics are “powerful vehicles for bringing a voice to civically disenfranchised communities.”⁹ The organization VoteHealth 2020 emerged from this effort, with badge stickers, email signatures and premade flyers for healthcare workers to unobtrusively build awareness and promote voter registration. Other strategies by civic-health organizations aim to normalize voter registration during other common waiting times, such as during the COVID-19 vaccine observation period and in regular preventive health interactions, such as during receipt of the annual influenza vaccine. Supporting patients' right to vote and holistically addressing their medical needs can be built on the synergy between civic and health engagement.

The responsibility to combat voter disenfranchisement must, in part, fall on the shoulders of healthcare professionals. As witnesses to devastating health inequities, healthcare workers have an ethical and professional obligation to deracinate the root causes of these disparities. Whether through individual efforts or in partnership with

civic-health organizations, care professionals must help build a healthier future for all by empowering patients to have a voice in the policies affecting their wellbeing. The path to equity and improved health can be paved through physicians promoting their patients' right to vote. □

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References

1. Voting Laws Roundup: July 2021. *Brennan Center for Justice* <https://www.brennancenter.org/our-work/research-reports/voting-laws-roundup-july-2021> (2021).
2. Brown, C. L., Raza, D. & Pinto, A. D. *Public Health Rev.* **41**, 16 (2020).
3. Shelton, A. *Power Coalition for Equity and Justice* <https://powercoalition.org/oped-voting-as-a-social-determinant-of-health/> (2021).
4. *Racial and Ethnic Health Disparities: What State Legislators Need to Know* (National Conference of State Legislators, 2013); <https://www.ncsl.org/portals/1/documents/health/HealthDisparities1213.pdf>
5. Greenwood-Erickson, M. B. & Kocher, K. *JAMA Netw. Open* **2**, e191919 (2019).

6. Voting and Registration in the Election of November 2020. *The United States Census Bureau* <https://www.census.gov/data/tables/time-series/demo/voting-and-registration/p20-585.html> (2021).
7. Second Annual Civic Health Month Launches August 1. *Civic Health Month* <https://www.civichealthmonth.org/press-releases> (2021).
8. Martin, A., Raja, A. & Meese, H. *Int. J. Emerg. Med.* **14**, 26 (2021).
9. Liggett, A., Sharma, M., Nakamura, Y., Villar, R. & Selwyn, P. *Ann. Fam. Med.* **12**, 466–469 (2014).

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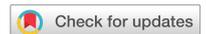
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Competing interests

A.F.M. is the founder and executive director of Voter. The other authors declare no competing interests.



A quality assessment tool for artificial intelligence-centered diagnostic test accuracy studies: QUADAS-AI

To the Editor — Over the next decade, systems that are centered on artificial intelligence (AI), particularly machine learning, are predicted to become key components of several workflows within the health sector. Medical diagnosis is seen as one of the first areas that may be revolutionized by AI innovations. Indeed, more than 90% of health-related AI systems that have reached regulatory approval by the US Food and Drug Administration belong to the field of diagnostics¹.

In the current paradigm, most diagnostic investigations require interpretation from a clinician to identify the presence of a target condition — a crucial step in determining subsequent treatment strategies. Despite being an essential step in the provision of patient care, many health systems find it increasingly difficult to meet the demand for the interpretation of diagnostic tests. To address this issue, diagnostic AI systems have been characterized as medical devices that may alleviate the burden placed on diagnosticians: by serving as case triage tools, enhancing diagnostic accuracy and stepping in as a second reader when necessary. As AI-centered diagnostic test accuracy (AI DTA) studies emerge, there has been a concurrent rise in systematic

reviews that amalgamate the findings of comparable studies.

Notably, of these published AI DTA systematic reviews, 94% have been conducted in the absence of an AI-specific quality assessment tool². The most commonly used instrument is the quality assessment of diagnostic accuracy studies (QUADAS-2) tool³. QUADAS-2 is a tool that assesses bias and applicability and its use is encouraged by current PRISMA 2020 guidance⁴. However, QUADAS-2 does not accommodate for niche terminology encountered in AI DTA studies, nor does it signal researchers to the sources of bias found within this class of study. Examples of such biases, when framed against the established domains of QUADAS-2 (patient selection; index test; reference standard; and flow and timing) are listed in Table 1.

To tackle these sources of bias, as well as AI-specific examples such as algorithmic bias, we propose an AI-specific extension to QUADAS-2 and QUADAS-C⁵, a risk of bias tool that has been developed for comparative accuracy studies. This new tool, termed QUADAS-AI, will provide researchers and policy-makers with a specific framework to evaluate the risk of bias and applicability when conducting reviews that evaluate AI

DTA and reviews of comparative accuracy studies that evaluate at least one AI-centered index test.

QUADAS-AI will be complementary to ongoing reporting guideline tool initiatives, such as STARD-AI⁶ and TRIPOD-AI⁷. QUADAS-AI is being coordinated by a global project team and steering committee that consists of clinician scientists, computer scientists, epidemiologists, statisticians, journal editors, representatives of the EQUATOR Network¹¹, regulatory leaders, industry leaders, funders, health policy-makers and bioethicists. Given the reach of AI technologies, we view that connecting global stakeholders is of the utmost importance for this initiative. In turn, we would welcome contact from any new potential collaborators. □

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