

Correspondence

Italy's policy shift on immunization

Italy's experience of mandatory vaccination could complement the latest French case study you discuss (see *Nature* 553, 249–250; 2018). It provides insight into why such a law was enforced in Italy, whether there might have been better alternatives and whether the law is working.

In 2017, it became compulsory in Italy to vaccinate infants against ten diseases: *Haemophilus influenzae* type b, measles, mumps, rubella, varicella and whooping cough (pertussis), as well as those that were already mandated (diphtheria, tetanus, polio and hepatitis B).

Unlike in France, immunization coverage in Italy had decreased alarmingly over the previous 5 years: a fall of 5.3% in 2011–15 for the measles vaccine, for example. Italy was subsequently ranked sixth-highest worldwide for measles cases in 2017 (it had 1,620; see go.nature.com/2o7jnw). Vaccination was swiftly made mandatory.

Pilot schemes in the Veneto region (5 million inhabitants) showed that alternative strategies were not feasible. The schemes suspended the formerly mandated vaccinations and invested in health education to promote voluntary vaccine uptake. This led to a decline in coverage for polio vaccine in 2006–16, for example: by 5.2% in Veneto compared with 3.3% nationwide (see C. Signorelli *et al.* *Ann. Ist. Super. Sanità* 53, 231–237; 2017).

The new law seems to be working. Preliminary data show that almost one-third of the previously unvaccinated children born in 2011–15 have now been immunized. Polio and measles vaccine uptake has increased by 1% and 2.9%, respectively, and by even more in selected regions (see C. Signorelli *et al.* *Lancet Infect. Dis.* 18, 26–27; 2018).

As public-health representatives, we acknowledge

that government action was epidemiologically justified. However, proactive intervention is still needed to enhance vaccine uptake and promote public trust. **Roberto Burioni, Anna Odone, Carlo Signorelli** *University Vita-Salute San Raffaele, Milan, Italy.* anna.odone@mail.harvard.edu

Democratize access to digital agronomy

Big data, field robotics and new sensing technology are set to revolutionize agriculture (see, for example, A. King *Nature* 544, S21–S23; 2017). The international community will need to step in to democratize access to these advances, and modify them to suit the smallholders who comprise the majority of farmers worldwide.

Around one-quarter of the world's food is produced on farms smaller than 2 hectares, and about half on farms less than 20 hectares (M. Herrero *et al.* *Lancet Planet. Health* 1, e33–e42; 2017). Such farms are restricted by limited infrastructure and a lack of money, so relatively few can afford advanced digital technologies. The majority must rely on mobile phones.

Although mobile-phone coverage has increased and cheap sensors can be deployed in the field, many smallholders have no Internet access and are unable to buy goods such as fertilizer or irrigation systems. There are shortfalls in the organization of supply chains, market access and advice for small farms. Such factors could stymie the vision of an agricultural revolution that is technology-based, inclusive and equitable.

To bridge these gaps, research institutes, governments, the private sector and agricultural-development organizations must commit to creating data-driven agronomy that is accessible to all. **Zia Mehrabi** *University of British Columbia, Vancouver, Canada.* **Daniel Jimenez, Andy Jarvis** *International Center for Tropical*

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Broaden behavioural addiction research

In our view, your call for government agencies to support research into gambling disorder (see *Nature* 553, 379; 2018) should be extended to a wider group of behavioural addictions. This work can then inform policy and public-health initiatives.

The American Psychiatric Association formally recognizes only gambling disorder as a behavioural addiction. Yet the gaming industry as a whole was estimated at more than US\$100 billion last year (go.nature.com/2egt8n). As in the case of gambling, many jurisdictions do not have agencies that support research into gaming.

The Internet has facilitated the availability, affordability and accessibility of gaming and other behaviours such as shopping and viewing pornography. The extent to which problematic engagement in these activities represents distinct disorders warrants further research, particularly given controversies regarding which disorders constitute behavioural addictions. In this process, their associated harms, clinical relevance, theoretical underpinnings and empirical evidence must be considered.

The World Health Organization has held annual meetings since 2014 to discuss pressing needs, research agendas and policy initiatives related to Internet use, with gaming disorder being proposed as a formal diagnosis (see also go.nature.com/2etzndv). Understanding the biological, psychological and social processes underlying addictive behaviours stands to improve prevention and treatment strategies. This is crucial for young people, given the pervasiveness of digital technologies and the potential impact of such behaviours on development.

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Don't conflate risk and resilience

'Risk' and 'resilience' are fundamentally different concepts that are often conflated. Yet maintaining the distinction is a policy necessity. Applying a risk-based approach to a problem that requires a resilience-based solution, or vice versa, can lead to investment in systems that do not produce the changes that stakeholders need.

Risk assessment and management consider efforts to prevent or defuse threats before they occur. Resilience assessment accepts the possibility of system failure and focuses on its recovery and adaptation. Resilience holds promise in many fields, including psychology, ecology and engineering, but can be misapplied in practice.

The US National Academy of Sciences, for example, defines resilience as "the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions". This meaning places risk within the definition of resilience: 'adapt' and 'recover' are resilience concepts; 'withstand' and 'respond to' are risk concepts. If experts wish to adopt a risk-based approach, they should focus on the ability to withstand and respond to threats. Likewise, for a resilience-based approach, they should focus on system recovery and adaptation in the aftermath of threats.

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