

► people, the Stolen Generations and their descendants are far worse off,” says Richard Weston, a descendant of the Meriam people from the Torres Strait, and chief executive of the Healing Foundation in Canberra, a government-funded organization that is working towards healing for the Stolen Generations and their descendants, and which commissioned the report. “Trauma stays with people, and its impacts are far-reaching and they’re profound,” says Weston.

The report examined health, cultural and socio-economic measures for about 7,900 Aboriginal and Torres Strait Islander children under the age of 15 who were living in households with at least one member of the Stolen Generations. These measures were compared with those of about 40,800 Indigenous children whose households included no adults who had been removed from their families as children. The relationships between the children and the members of the Stolen Generation in their households were not reported.

The analysis showed that 17.2% of Indigenous children living in Stolen Generations households reported having missed school without permission in the previous

year, compared with 4.1% of the reference group. Children in Stolen Generations families were also nearly twice as likely to report having been “treated unfairly” at school because they were Indigenous, and 26% of Indigenous children living in Stolen Generations households rated their health as poor, compared with 19.2% of the comparison population.

“The results from the survey show how much suffering is still being endured from these policies.”

owned by a household member.

The analysis also considered the effects of other factors on the children’s health and socio-economic measures irrespective of whether they lived in a Stolen Generations household, such as age and gender, and whether the children lived in a remote area or in a household with someone who was employed, had completed school or had been incarcerated. The results show that removal

has intergenerational effects even after controlling for these factors.

The report concludes that children living in a Stolen Generations household were more likely to experience adverse outcomes than were other Indigenous children, and that this “demonstrates a transfer of intergenerational poverty and trauma”.

“The results from the survey show how much suffering is still being endured from these policies,” says Maggie Walter, a Palawa woman from Tasmania and a sociologist at the University of Tasmania in Hobart. “It is ricocheting through generations.”

But the report did find that Indigenous children living in Stolen Generations households were twice as likely as Indigenous children not living in these households to identify with a clan, tribal or language group, and to recognize an area as homeland.

Although the report highlights the difficulties these children face, Walter worries that focusing on households will inadvertently place the blame on them. “What we need to be looking at is wider social and cultural reality in which that family, both current and previous generations, have lived their lives.” ■

METROLOGY

Pressure gets an upgrade

A 400-year-old method for measuring the quantity has a rival based on quantum physics.

BY ELIZABETH GIBNEY

Researchers in the United States have developed a new way to define and measure pressure and its unit, the pascal — one that they say will, within a year, begin to replace the mercury-based measurement methods that have been in use since 1643.

Pressure is conventionally defined as force per unit area, and the pascal is a force of 1 newton per metre squared. For nearly 400 years, values at air pressure and below have been measured using mercury-based instruments called manometers. The US National Institute of Standards and Technology (NIST) in Gaithersburg, Maryland, holds one of a handful of the world’s most precise manometers, known as primary standards — huge instruments that serve as the benchmarks against which all other pressure sensors are calibrated. But NIST scientists have now developed a highly precise method for measuring pressure that is based on treating it as energy density. This is an equivalent physical description to force per unit area because it is derived from the same combination of ‘base’ units, the most fundamental units of measure in the International System of Units (SI).

The NIST method involves probing atoms of

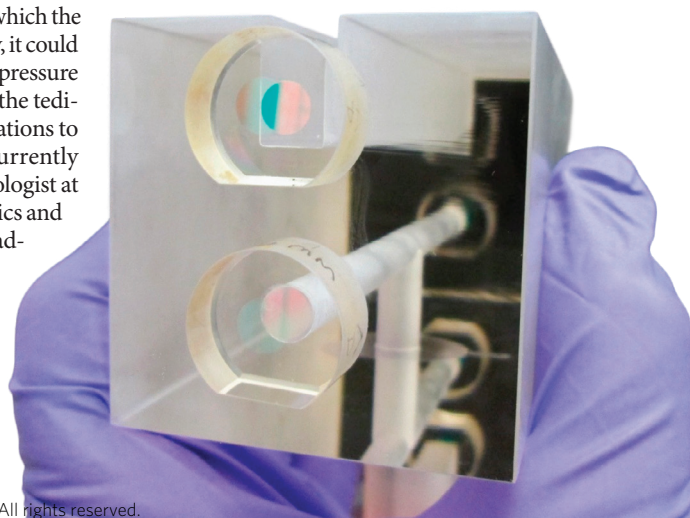
gas in a cavity directly with a laser to determine their pressure. The team hopes to show in the next year that its apparatus can rival the manometer — and to encourage other metrology labs to use it as their primary standard.

If widely accepted by the metrology community, the method would do away with the need for mercury, which is toxic and faces international bans. Moreover, the new technique allows metrologists to measure pressure directly, using a fundamental constant of nature, and does not rely on previous measurements of other quantities, such as density, on which the manometer depends. In theory, it could also allow anyone to measure pressure from first principles without “the tedious work of” a chain of calibrations to a primary standard that is currently required, says Bo Gao, a metrologist at the Technical Institute of Physics and Chemistry of the Chinese Academy of Sciences in Beijing, who works on a related method to measure low temperatures. The technique

could enable faster measurements with more-portable equipment, benefiting industries such as aviation and semiconductor manufacturing.

Metrologists have long wanted to replace manometers, the principles of which date back to the mercury pressure gauge invented by Italian physicist Evangelista Torricelli in 1643. Modern manometers have two tall columns of mercury, and measure the force exerted on a surface due to a pressure by balancing it against the force generated by the weight of mercury.

NIST



The FLOC measures gas pressure using lasers.

SIPA ASIA VIA ZUMA

Pressure is derived using gravity and a measurement of the density of that particular sample of mercury. Manometers have also reached their limit of precision, whereas there is room to improve the new method's uncertainties, says Jay Hendricks, a metrologist at NIST who is leading the project.

NIST's new pressure sensor, called a fixed-length optical cavity (FLOC), compares the speed of a laser travelling through a gas-filled cavity with that of an identical beam in a vacuum. The speed of light varies with the density of the gas in a way that quantum chemists can calculate on the basis of the properties of atoms. For a steady-temperature system, metrologists can combine these density measurements — effectively, the number of particles in the cavity — with the Boltzmann constant, which relates temperature to kinetic energy. This gives the 'energy density' of the gas, which is equivalent to pressure.

The method is "neat", says Hendricks, because it measures pressure by counting the number of gas particles in the cavity, using just quantum calculations and a fundamental constant of nature. This is in the spirit of the newly reformed SI base units, which last month were all redefined so that they link to fundamental constants, rather than to arbitrary references or objects. "This is fantastic from a metrology point of view," he adds.

The technique has potential, says Gao. But some issues, such as understanding how impurities in the gas affect measurements, need ironing out. The team is working on these issues to reduce uncertainties, but Hendricks says that, at certain pressures, the FLOC will be ready to use as a primary standard — against which NIST calibrates sensors used in industry — within a year.

The team says that FLOC measurements have an uncertainty of six parts per million at atmospheric pressure — almost on a par with the mercury method — but for lower pressures, its uncertainties are one-third of those of the manometer. The results are "impressive", says Stuart Davidson, a metrologist at the National Physical Laboratory in Teddington, UK.

But metrologists worldwide still need convincing that the FLOC is ready for prime time. NIST must first make the FLOC its primary standard, by publishing comparisons made against its manometer and doing an internal review. To gain official recognition that its FLOC claims are accurate, NIST must apply to a group at the International Committee for Weights and Measures, which will oversee a comparison against conventional equipment at Germany's metrology institute, the PTB, in Braunschweig.

To fully embrace the new method, metrologists might need to see a FLOC that has been created in another lab achieve the same results. "For new experiments to be validated and for people to have confidence in them, it's going to take a long time," adds Davidson. ■



The origin of organs used in transplants in China is the focus of a startling report.

ETHICS

Transplant research under scrutiny

Report concludes that prisoners in China are being killed for their organs — and raises the alarm about research.

BY DAVID CYRANOSKI

A startling report concluding that prisoners in China are being killed for their organs has renewed concerns about the origins of some organs used in research.

On 17 June, the China Tribunal, a panel established by the non-governmental organization the International Coalition to End Transplant Abuse in China (ETAC), concluded that prisoners in China, in particular those imprisoned for their political or religious views, have been killed for their organs for years. It said that the practice — which it branded a crime against humanity — probably still continues.

The seven-member panel took evidence in London and was chaired by barrister Geoffrey Nice, but has no legal authority. It looked at lines of evidence including analyses of Chinese transplant data and expert testimony from doctors, human-rights workers and former prisoners.

The Chinese government has yet to respond to the tribunal's report, but has previously admitted that, in the past, it took organs from prisoners who had been sentenced to death. It says the practice has been banned since it introduced a voluntary donor programme in 2015. The government has denied that it ever killed people solely to harvest their organs.

The report "illustrates the gravity of events transpiring in China", says Wendy Rogers, an ethicist at Macquarie University in Sydney, Australia, who has investigated the extent to which studies in the scientific literature have relied on organs obtained unethically in China, and who chairs the international advisory committee of the ETAC.

"I hope hospitals and journals will take a closer look at their policies," adds Rogers, who testified on her research findings to the panel.

The World Health Organization and the World Medical Association condemn the practice of procuring organs for transplant from executed prisoners. The use of data from such organs for research is also widely criticized, and a number of journals have policies that ban the publication of such data.

Some journals took action following the publication in *BMJ Open* in February of a paper, co-authored by Rogers, that analysed almost 450 studies of transplants — representing more than 85,000 organs — that took place in China (W. Rogers *et al. BMJ Open* 9, e02447; 2019). The studies were published between 2000 and 2017. The analysis found that 86% of the papers failed to follow ethical standards by stating the provenance of the organs or giving a statement about the cause of death of the donors. Only ►