

NEWS IN FOCUS

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About 33,000 babies have been recruited for the Born in Guangzhou Cohort Study since 2012.

EPIDEMIOLOGY

Gigantic Chinese–baby study yields rich results

Public–health insights have already emerged, and microbiome research is under way.

BY DAVID CYRANOSKI

An ambitious Chinese study tracking tens of thousands of babies and their mothers has begun to bear fruit — just six years after the study’s leaders recruited their first sets of mothers and babies.

Researchers have already published results based on the cohort study, some with important public-health implications. And many more investigations are under way. One will examine infants’ microbiomes, the collections of bacteria and other microorganisms that inhabit their bodies — a hot topic in

health research and a key goal of the study.

The Born in Guangzhou Cohort Study¹ has recruited about 33,000 babies and their mothers since 2012. The study’s leaders are hoping to reach 50,000 baby–mother sets by 2020. And this year, investigators started recruiting 5,000 maternal grandmothers to the project, enabling research across multiple generations.

“The data is vast, and there is space for many different groups globally to mine this information,” says Maria Gloria Dominguez-Bello, a microbiologist at Rutgers, The State University of New Jersey, in New Brunswick, who is not involved in the study. “I really

admire this effort from the Chinese team.”

Ezra Susser, an epidemiologist from Columbia University in New York City, says the cohort is also important because it is tracking mothers and babies during a period of rapid economic development and social change in China, where previous studies of this type have been limited in scale.

The Guangzhou project aims to set itself apart from previous large birth-cohort studies in Norway and Denmark by enabling detailed investigations of the links between the microbiome and disease. Two others, in the United States and United Kingdom, had planned ▶

► to include microbiome data, but both were cancelled because of trouble recruiting participants. The US study also struggled with excessive costs and management issues.

The Chinese team has so far avoided similar problems. Its rich collection of 1.6 million biological samples includes stools, blood, placental tissue and umbilical cords. Extensive surveys also record participants' eating habits, mental health, and other lifestyle factors, such as the amount of mould in their houses.

FIRST FINDINGS

Incense burning is common in southern China, and one study based on the Guangzhou project found that exposure to the resulting fumes increases the risk of hypertension in expectant mothers².

Another study found that progesterone, a drug used around the world to reduce the risk of a preterm birth, was prescribed too early in pregnancy in more than 40% of women studied³. The researchers found that giving women the drug before 14 weeks of gestation did not reduce their chances of a preterm birth, but put them at higher risk of needing a caesarean section and of developing postpartum depression. The authors consider the

findings “an urgent public-health concern”.

Other studies are in progress. A team from the University of Birmingham, UK, and BGI, one of China's largest genome-sequencing institutes, in Shenzhen, is trying to characterize how the microbiomes of babies born vaginally — who are exposed to their mothers' microbes on their journey down the birth

“The data is vast and there is space for many different groups globally to mine this information.”

canal — differ from those of infants born by caesarean section. Although similar studies have been done on a smaller scale, Dominguez-Bello says that the Guangzhou cohort will offer statistical power to separate out other variables that could influence an infant's microbiome. These include pre- and postnatal medications and environmental pollutants.

Xiu Qiu, an epidemiologist at Guangzhou Women and Children's Medical Center and the director of the Guangzhou project, is using the cohort data to test her surprising, but tentative, finding that older mothers having a second child have a lower risk of depression during pregnancy than do women pregnant with their

first child³. She had expected that women who already have a baby when they are pregnant would be under more stress and face a higher financial burden, and so would be more likely to experience depression. The end of China's one-child policy in 2016 means the birth-cohort study offers a fresh opportunity to study an increasing number of women, many of them older, who are having a second child, she says.

Sing Sing Way, a paediatrician at the Cincinnati Children's Hospital in Ohio, meanwhile, will be looking at the data provided by the addition of grandmothers to the study to understand why cells from mothers can live on indefinitely in their offspring. Studies in mice suggest that these cells have a protective role when the offspring are pregnant, says Way⁴.

Xia Huimin, a co-founder of the project, says that the Guangzhou cohort has the power to answer many more questions like this. He hopes scientists around the world will use it. “We would like scientists from everywhere to work with us.” ■

1. Qiu, X. *et al. Eur. J. Epidemiol.* **32**, 337–346 (2017).
2. He, J.-R. *et al. Sci. Total Environ.* **610–611**, 1421–1427 (2018).
3. Shen, S. *et al. Lancet* **386**, S58 (2015).
4. Kinder, J. M. *et al. Cell* **162**, 505–515 (2015).

MEDICAL RESEARCH

Longevity data hint at no natural limit on lifespan

Death rates plateau in elderly people, reviving a debate about how long humans can live.

BY ELIE DOLGIN

There might be no natural limit to how long humans can live — at least not one yet in sight.

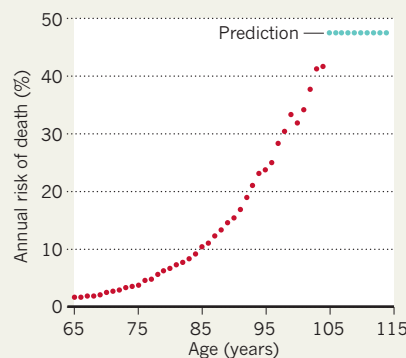
That proposal — which runs contrary to the claims of some demographers and biologists — comes from a statistical analysis published on 28 June in *Science*. It examined the probabilities of survival of nearly 4,000 ‘super-elderly’ people in Italy, all aged 105 and older (E. Barbi *et al. Science* **360**, 1459–1461; 2018).

The study was led by Sapienza University demographer Elisabetta Barbi and University of Roma Tre statistician Francesco Lagona, both based in Rome. Their team found that the risk of death — which, throughout most of life, seems to increase as people age — levels off after age 105, creating a ‘mortality plateau’. At that point, the researchers say, the odds of someone dying from one birthday to the next are roughly 50:50 (see ‘Longevity unlimited’).

“If there is a mortality plateau, then there is

LONGEVITY UNLIMITED

A person's chances of dying tend to increase throughout adulthood, but a model based on data from 3,836 people aged 105 or older predicts that this trend flattens out in very elderly people.



no limit to human longevity,” says Jean-Marie Robine, a demographer at the French Institute of Health and Medical Research in Montpellier.

That would mean that someone such as Chiyo Miyako, a Japanese great-great-great-grandmother who, at 117, is the world's oldest known person, could live for years to come — or even forever, at least hypothetically.

Researchers have long debated whether humans have an upper age limit. The consensus holds that the risk of death steadily increases in adulthood, up to about age 80 or so. But there's vehement disagreement about what happens as people enter their 90s and 100s.

Some scientists have examined demographic data and concluded that there is a fixed, natural ‘shelf life’ for our species, and that mortality rates keep increasing. Others have looked at the same data and concluded that the death risk flattens out in one's ultra-golden years, and therefore that human lifespan does not have an upper threshold.

In 2016, geneticist Jan Vijg and his colleagues at Albert Einstein College of Medicine in New York City rekindled the debate when they analysed the reported ages at death for the

SOURCE: BARBI ET AL. (2018).

world's oldest individuals over half a century. They estimated that human longevity hit a ceiling at about 115 years — 125 tops.

Vijg and his team argued that given few, if any, gains in maximum lifespan since the mid-1990s, human ageing had reached its natural limit (X. Dong *et al. Nature* 538, 257–259; 2016). The longest known lifespan belonged to Jeanne Calment, a French super-centenarian who died in 1997 at age 122.

Experts challenged the statistical methods in the 2016 study, setting off a firestorm into which Barbi and Lagona now step. Working with colleagues at the Italian National Institute of Statistics, the researchers collected records on every Italian aged 105 years and older between 2009 and 2015 — gathering certificates of death, birth and survival in an effort to minimize the chances of 'age exaggeration', a common problem among the oldest old.

They also tracked individual survival trajectories from one year to the next, rather than lumping people into age intervals as previous studies that combine data sets have done. And by focusing just on Italy, which has one of the highest rates of centenarians per capita in the world, they avoided the issue of variation in data collection between different jurisdictions.

As such, says Kenneth Howse, a health-policy researcher at the Oxford Institute of Population Ageing, UK, "these data provide the best evidence to date of extreme-age mortality plateaus in humans".

Ken Wachter, a mathematical demographer at the University of California, Berkeley, and an author of the latest study, suspects that previous disputes over the patterns of late-life mortality have largely stemmed from bad records and statistics. "If we can get data of this



Emma Morano, who died in 2017 at age 117, was the last surviving person born in the nineteenth century.

quality for other countries, I expect we're going to see much the same pattern."

Robine is not so sure. He says that unpublished data from France, Japan and Canada suggest that evidence for a mortality plateau is "not as clear cut". A global analysis is still needed to determine whether the findings from Italy reflect a universal feature of human ageing, he says. Brandon Milholland, a co-author of the 2016 *Nature* paper, says that the evidence for a mortality plateau is "marginal", because the latest study included fewer than 100 people who lived to 110 or beyond. Leonid Gavrilov, a longevity researcher at the University of Chicago in Illinois, notes that even small inaccuracies

in the Italian longevity records could lead to a spurious conclusion.

Others say the conclusions of the study are biologically implausible. "You run into basic limitations imposed by body design," says Jay Olshansky, a bio-demographer at the University of Illinois at Chicago, noting that cells that do not replicate, such as neurons, will continue to wither and die as a person ages, placing upper boundaries on humans' natural lifespan.

This study is thus unlikely to be the last word on the age-limit dispute, says Haim Cohen, a molecular biologist at Bar-Ilan University in Ramat-Gan, Israel. "I'm sure that the debate is going to continue." ■

CLIMATE CHANGE

Cyprus asserts itself as hub for climate research

Proposed science institute will focus on the Mediterranean and Middle East.

BY ANITA MAKRI

The tiny island of Cyprus is reshaping itself into a regional hub for climate-change research. The country lies at the meeting point of the Mediterranean, the Middle East and North Africa — areas where climate change is expected to take a heavy toll in the coming decades, but in which research capacity to address the issue is limited.

Cyprus's President Nicos Anastasiades announced plans on 5 June to create a government initiative that will coordinate

action against global warming across the Mediterranean and support the creation of a €30-million (US\$35-million) climate-change research centre at the Cyprus Institute in Nicosia, the nation's leading multidisciplinary research institution. "This is a priority issue for the government," says Theodoros Mesimeris, head of the climate-change division of the Cypriot environment ministry. The initiative will also create a comprehensive plan for reducing Cyprus's greenhouse-gas emissions in line with goals set by the 2015 Paris climate accord.

Resources for climate research in the region

are too small to scope out even the challenges, let alone the solutions, says Costas Papanicolas, president of the Cyprus Institute, who helped to plan the initiative with government ministers and Anastasiades.

Climate models suggest that the Mediterranean and Middle East are getting warmer and drier at a rate faster than the global average; precipitation in the Mediterranean is expected to drop, especially in summer, by as much as 30–40% by the end of the century if no mitigation efforts are made, according to Filippo Giorgi, an Earth-systems physicist at the ▶



Water scarcity is a growing problem in Cyprus and the surrounding region.

► International Centre for Theoretical Physics in Trieste, Italy. Rains — when they come — will be more intense. Crop failures, forest fires and freshwater shortages² are just some of the issues that threaten economies, lifestyle and tourism. Parts of the region are set to become uninhabitable. In the Middle East, for instance, average maximum temperatures could increase from 43°C to almost 50°C by the end of this century, without mitigation³.

“There is warming, and there is no

mechanism to counteract the warming,” says Jos Lelieveld, an atmospheric chemist at the Max Planck Institute for Chemistry in Mainz, Germany, who also works at the Cyprus Institute.

REGIONAL IMPACT

Few monitoring systems exist in the eastern Mediterranean and Middle East to systematically measure variables such as temperature, humidity and desertification. The monitoring that does exist is inconsistent, and the data are

too poor to feed into climate-change models, which would help researchers to understand local impacts and refine policy options.

At the core of the proposed hub — the Eastern Mediterranean Middle East Climate and Atmosphere Research Centre — will be a high-quality observatory for monitoring concentrations of greenhouse-gas emissions and atmospheric contaminants, which will take advantage of Cyprus’s geographical location to establish the region’s contributions.

The centre will absorb the existing climate-research activities of the Cyprus Institute. The institute, launched in 2007, has already helped to raise awareness of the issue in the region, says Khaled Toukan, chairman of the Jordan Atomic Energy Commission and the country’s former energy minister. Jordan and other countries in the Middle East are moving towards clean energy, he says, but purely from an economic perspective.

Papanicolas says that the institute is capitalizing on Cyprus’s position as the only European Union country in the Middle East. It has already won €400,000 in EU research money to develop a plan for the facility, and it is now preparing a bid for €15 million in EU funding, which would be matched by the Cypriot government and would bankroll the centre for the next decade. ■

1. IPCC. *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects* (Cambridge Univ. Press, 2014).
2. Lelieveld, J. *et al. Clim. Change* **114**, 667–687 (2012).
3. Lelieveld, J. *et al. Clim. Change* **137**, 245–260 (2016).

PETROS KARADIAS/AP/REX/SHUTTERSTOCK

ASTRONOMY

NASA telescope’s woes grow

The James Webb Space Telescope’s cost and schedule problems threaten other big missions.

BY ALEXANDRA WITZE

NASA’s beleaguered James Webb Space Telescope (JWST) is facing yet another delay, and will not launch until March 2021. That’s ten months later than the tentative schedule that the agency announced just three months ago. To meet the new target, NASA must persuade lawmakers in Congress to approve a higher price for the mission.

The space agency estimates that the latest delay will add US\$800 million to the telescope’s cost, on top of the \$8 billion Congress has already approved for its development. NASA plans to make up that shortfall in part by using money that had been intended to support the telescope’s science operations in space. Still, the delays will loom over the agency’s astrophysics budget, with unknown effects on the next big

space telescope in NASA’s queue: the Wide-Field Infrared Survey Telescope (WFIRST).

“I’m not happy sitting here,” said Thomas Zurbuchen, NASA’s associate administrator for science, at a 27 June news briefing on the delay. But he said that ensuring a successful mission was worth the extra time and money. Among other things, the telescope will peer

back in time to explore some of the earliest galaxies to form in the Universe, and will probe the atmospheres of planets around other stars.

“JWST should continue because of the compelling science and because of its national importance,” said Thomas Young, a retired executive with Lockheed Martin in Bethesda,

Maryland. He oversaw an independent review of the telescope project that led to the revised schedule and budget estimates.

Members of Congress have sharply criticized NASA for previous JWST delays, and the latest announcement has continued the pattern. “Programme delays and cost overruns don’t just delay the JWST’s critical work, but they also harm other valuable NASA missions, which may be delayed, defunded, or discarded entirely,” said Representative Lamar Smith (Republican, Texas), the chairman of the House science committee, in a statement.

JWST is the most complex astronomical telescope ever built, and problems have piled up towards the end of its development. The observatory is undergoing extensive testing at Northrop Grumman Aerospace Systems in Redondo Beach, California. The independent review

found that engineers made several errors at Northrop, including using the wrong solvent to clean valves, which later leaked, and not tightening the sunshield fasteners properly.

The JWST has a 6.5-metre-wide segmented mirror that will launch in a folded configuration and then unfurl once it is in space. The telescope's sunshield must also deploy without a hitch. JWST is technologically more complex than the Hubble Space Telescope, whose primary mirror was ground incorrectly, a problem discovered after launch. Astronauts fixed Hubble's vision in low Earth orbit, but repairs in space won't be possible for JWST, which will orbit 1.5 million kilometres from Earth.

Until last September, JWST was on track for an October 2018 launch. Then NASA pushed the date to June 2019, then May 2020 — and now March 2021.

DECADAL DETOUR

The previous delay, which NASA announced in March, had prompted Zurbuchen to propose that the US astronomy community postpone its next 'decadal survey'. This influential process, which takes place every ten years, asks astronomers to decide which scientific questions their field should tackle and what facilities they need to answer those questions. Preparations for the next survey, which is due in 2020, were well under way when Zurbuchen suggested delaying it.

But the two other agencies involved in the survey — the US National Science Foundation and the Department of Energy — did not want to put it off. And neither did most of the astronomers polled by the US National Academies of Sciences, Engineering and Medicine, which oversees the survey. In late May, Zurbuchen reversed his stance, and the survey is now on track to meet its original deadline.

On 27 June, Paul Hertz, NASA's head of astrophysics, told an advisory committee that the rising costs for JWST were "likely to impact other science programmes". At particular risk is WFIRST, slated for launch in the mid-2020s. Just as JWST was the highest priority recommendation from the 2000 decadal survey, WFIRST was the highest priority in the 2010 decadal survey. Both are being developed by NASA's astrophysics division. The Trump administration has proposed cancelling WFIRST, although Congress has so far come to its rescue with continued funding.

In the long run, JWST promises revolutionary research that cannot be achieved any other way, says Jason Kalirai, an astronomer at the Space Telescope Science Institute in Baltimore, Maryland, and the project scientist for the telescope. "We need JWST to make the next big breakthroughs in astrophysics — and are willing to wait for it," he says. ■

FUNDING

EU crackdown on 'ethics dumping'

Fund aims to stop scientists exporting dubious research.

BY LINDA NORDLING

Ethics dumping — doing research deemed unethical in a scientist's home country in a foreign setting with laxer ethical rules — will be rooted out in research funded by the European Union, officials announced last week.

Applications to the EU's €80-billion (US\$93-billion) Horizon 2020 research fund will face fresh levels of scrutiny to make sure that research practices regarded as unethical in Europe are not exported to other parts of the world. Wolfgang Burtscher, the European Commission's deputy director-general for research, made the announcement at the European Parliament in Brussels on 29 June.

Burtscher said that a new code of conduct developed to curb ethics dumping will soon be applied to all EU-funded research projects. That means applicants will be referred to the code when they submit their proposals, and ethics committees will use the document when considering grant applications.

The rules will apply to all research funded under Horizon 2020, and to all future EU funding programmes. The EU had banned ethics dumping in Horizon 2020 grants since 2013. But no clear guidelines existed to help ethics reviewers and researchers identify potential digressions in grant applications. The code, drafted as part of a Horizon 2020-funded project called TRUST, was published in May; the latest announcement gives it teeth.

The code provides clear guidance for doing research in resource-poor settings. Animal studies, for example, must not be conducted outside the EU if they would not be allowed in the scientists' home country. Another provision states that "lower educational standards, illiteracy or language barriers" among research

participants can never be an excuse to hide information from them or provide it incompletely. The code also addresses situations that might not arise in Europe-based studies. For instance, sex work is legal in many countries in Europe but not in Kenya. And homosexuality is illegal in many countries worldwide. So studies involving sex workers or gay people, for example, must take measures to ensure the safety of participants.

The ethics-dumping guidelines were produced with representatives from such vulnerable populations. Joyce Adhiambo, a Kenyan former sex worker who promotes sex workers' rights in research and in HIV-prevention services, sees the code as a matter of mutual respect. "When [researchers] want something from sex workers, we deal with it respectfully. We ask the same in return," she said at the Brussels event.

Adhiambo told *Nature* that researchers must use their privileged position to encourage communities to become actively involved in studies. Members could be hired as research assistants, for example, or to help translate and explain consent forms to participants. "We come from a poor setting but we have a voice. We have a culture and a way of living. We have our traditional knowledge, and when we walk in the path together, we are going to make a brighter future for all these research projects."

Ethics dumping — coined by the European Commission in 2013 — is a contentious term, and few researchers admit to the practice. In a recent book, researchers with the TRUST project cited research carried out on wild-caught monkeys in Africa, and clinical trials in India in which people living in poverty were denied life-saving screening in the control arm, as examples of ethics dumping (see go.nature.com/2mkhcx4). ▶



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NATURE PODCAST



A DNA computer; the koala genome; and the invisibility of LGBTQ+ researchers nature.com/nature/podcast



A research code of ethics contains input from vulnerable groups, including sex workers in Kenya.

► None of those projects was funded by the EU, says Doris Schroeder, a lead investigator on the TRUST project. But in her 15 years chairing ethics review panels for EU funding programmes, Schroeder has seen many applications that would violate the new code. These ranged from researchers wanting to interview workers about their rights in dictatorial states (potentially placing these people at risk) to art installations portraying vulnerable

populations without their involvement. Those projects were changed before getting funding approval, Schroeder says. But without a clear code of conduct, it's possible that other ethics committees might have let them through.

Ron Iphofen, an adviser on research ethics to the European Commission, thinks that the code will have a profound impact on how funding proposals to the EU are designed and reviewed. "I could envisage reviewers now

looking suspiciously at any application for funds that entailed research by wealthy nations on the less wealthy that did not mention the code," he says.

Opportunities for ethics dumping have grown with the globalization of research, says Philip Brey, a research-ethics specialist at the University of Twente in the Netherlands. Increasingly, researchers from high-income countries carry out projects in low- and middle-income ones. But Brey says that the decision to export research is often driven by scientific opportunities or economic realities, rather than by a desire to skirt ethics. Moreover, some scientists in poorer countries find the term 'ethics dumping' offensive. "They tend to see themselves not as having lower ethical standards, but different ethical standards," says Brey.

Reinhard Hiller, managing director of the Centre for Proteomic and Genomic Research in Cape Town, South Africa, worries that, in some cases, developed nations' ethical standards could stifle research in developing nations. For example, to speed up and improve the quality of their diagnoses, doctors in Africa might want to use WhatsApp to share patient information such as X-rays, says Hiller. Yet this could fall foul of Europe's strict data-privacy rules, for example. "It's not black or white, but needs to be assessed on a case-by-case basis," he says. ■