

Imperial College  
London

J IDEA

Abdul  
Latif  
Jameel

Institute for  
Disease and  
Emergency Analytics



# Annual report of the Jameel Institute

<https://www.imperial.ac.uk/jameel-institute/>

2020

# Abdul Latif Jameel Institute for Disease and Emergency Analytics (J-IDEA)



The year since we launched the Abdul Latif Jameel Institute for Disease and Emergency Analytics (also known as the Jameel Institute) has been incredible. We are so fortunate to have created this timely and powerful new partnership. Imperial College London combined its amazing academic strength with a world-leading foundation, Community Jameel, just before the world was so quickly turned upside down by an emergency of epic proportions.

The global leadership the Jameel Institute has shown was driven by its tireless leaders: Professor Neil Ferguson and Dr Katherina Hauck, and their incredible team members. They have worked night and day to advance understanding of the pandemic and provide rational, evidence-based advice to governments globally. Their scientific papers have changed the world.

Speed is critical in the beginning of a pandemic. Their paper on the 17th of January analysing the three cases outside of China was the clarion call for the world to recognise that this was “substantial human-to-human transmission”. They have put out 39 more reports, numerous sources of information, maps to drive policy and planning, and a highly popular online course with Coursera: “Let’s Talk about COVID-19”.

The Jameel Institute’s work on chronic and other infectious diseases, our community and government engagement on education and policy, and our training of the next generation of public health leaders, is proceeding at pace despite the disruption to ways of working. There has never been a time when an Institute like ours has been more relevant, necessary, and important. The College is committed to working to develop the Institute’s position as a research and education leader and public resource.

Thanks to Community Jameel and others, we will soon begin construction on our transformative new School of Public Health building in the White City Campus where active collaboration across disciplines, sectors, and clinical providers will be a reality. There, the Jameel Institute and others will lead the field of Public Health as a multidisciplinary, data-driven way of working, collaborating with the neighbourhood community, governments and people around the world.

Thank you for your continued support.

Professor Alice P. Gast  
President

## Foreword

### **Professor Neil Ferguson (Director of the Jameel Institute)**



We are living in unprecedented times where this existential health crisis has profoundly affected how we lead our lives. Our epidemiological models have been vital in informing policy, and our work has been disseminated all over the world. At times, this has proved to be challenging; however, the Institute has remained focused on our priorities and research themes of responding to emergencies, strengthening health systems, and building partnerships and capacity.

The COVID-19 pandemic catapulted the Jameel Institute into the global spotlight, just four months after it had been founded. The Jameel Institute was established for precisely this kind of health emergency. Our quantitative approach spanning data analytics, epidemiological modelling, and health system analysis, is proving a powerful weapon in combating the threat of COVID-19. The Jameel Institute demonstrated the power of data analytics when uncertainty is high, and the outlook seems bleak.

The founding of the Jameel Institute was built on 10 years' experience of responding to emerging and endemic disease threats with our partners. Bringing together institutes from across the School of Public Health under the umbrella of the Jameel Institute, we have amplified our expertise to help prevent and combat global health challenges. The Jameel Institute allows us to go further and work with our colleagues and policy partners around the world in a truly collaborative spirit. Our work on the COVID-19 pandemic has helped us to strengthen relationships and partnerships with both supranational and local organisations. We will build on these partnerships going forward.

Under our key research themes, we are harnessing our skills and knowledge in data analytics to enable better and more efficient health responses worldwide. The biggest predictor of how well countries respond to a health crisis is the strength of their health systems. It is my pleasure to summarise in this report the important research undertaken by the Jameel Institute during its first year.



*Professor Neil Ferguson giving an update on his team's work in the first Jameel Institute video relating to COVID-19 produced in February 2020.*

## Introduction

This report summarises the activities of the Jameel Institute over the last year. Whilst one of our key priorities has been responding to an unprecedented global pandemic, the Institute has also focused on a range of themes and topics which are all covered under our core research themes of responding to health emergencies, strengthening health systems and building partnership and capacity. The report will also cover how the Institute has been supporting and enabling a wide and diverse programme of research and our how our communications activities have positioned the Jameel Institute as Imperial's expertise in disease control analytics, namely through the symposium.

## Executive Committee

### **Professor Neil Ferguson Director of the Jameel Institute**



Professor Ferguson's research aims to improve understanding of the epidemiological factors and population processes shaping infectious disease spread in human and animal populations. A key practical focus is the analysis and optimisation of intervention strategies aimed at reducing transmission or disease burden. Much of his work is applied, informing disease control policymaking by public and global health institutions. Professor Ferguson has been leading on the COVID-19 response along with the wider Imperial COVID-19 Response Team.

### **Dr Katharina Hauck Deputy Director of the Jameel Institute**



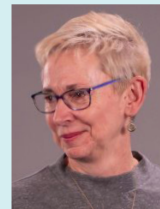
Dr Katharina Hauck is a reader in health economics. She is specialised in the economics of infectious diseases and the economic evaluation of complex public health interventions. Her specific research interests focus on integrated economic-epidemiological models to analyse the impact of infectious disease on economic outcomes, strengthening health systems, priority setting and cost-effectiveness analysis, and the role of individual behaviour in infectious disease transmission.

### **Professor Timothy Hallett Research Lead at the Jameel Institute**



Professor Timothy Hallett's work focusses on Applied Global Health analytics and his research group centres on the development and application of mathematical models for interpreting surveillance data, analysing control trials and planning interventions. The overall aim of this research is to come to conclusions about the best use of limited resources in the response to a wide variety of health challenges worldwide.

### **Professor Helen Ward Research Lead at the Jameel Institute**



Professor Helen Ward is Clinical Professor of Public Health at Imperial College London and an NIHR Senior Investigator. She has three decades of experience in research, education and applied public health, working on the epidemiology and control of sexually transmitted infections and HIV, and the development of participatory approaches in health research.

**Professor Kalipso Chalkidou**  
**Research Lead at the Jameel Institute**



Professor Kalipso Chalkidou is the Director of Global Health Policy and a Senior Fellow at the Center for Global Development, based in London, and a Professor of Practice in Global Health at Imperial. Her work focuses on helping governments build technical and institutional capacity for using evidence to inform health policy as they move towards Universal Healthcare Coverage. She has been involved in the Chinese rural health reforms and in national health reform projects in Colombia, Turkey and the Middle East, working with the World Bank, PAHO, DFID and the Inter-American Development Bank as well as national governments.

**Professor Majid Ezzati**  
**Research Lead at the Jameel Institute**



Professor Majid Ezzati directs an interdisciplinary research programme that brings together early career researchers from medicine, engineering, environmental science, mathematics and computing, that investigate important questions in global health. Health inequalities and how to reduce them through social, environmental, and health systems intervention, are a central focus of the group's research.

**Professor Edward Gregg**  
**Research Lead at the Jameel Institute**



Edward Gregg is a Professor in the Department of Epidemiology and Biostatistics. Prior to coming to Imperial, he led a multi-disciplinary public health science unit in the Division of Diabetes Translation at the U.S. Centers for Disease Control and Prevention where he championed the role of epidemiology for public health decision-making through diverse disciplines, including population surveillance, effectiveness trials, natural experiments, and health impact modelling. He has particular interests in the factors driving recent trends in the diabetes epidemic and the impact of lifestyle interventions and related health policies on diabetes, cardiovascular disease, and ageing-related outcomes.

## **Research overview**

The Jameel Institute conducts research on a wide range of topics and with many collaborators. Under the umbrella of the Jameel Institute, researchers have undertaken work across our priority areas: responding to emergencies, strengthening health systems, and partnership and capacity building.

### **Responding to health emergencies**

In its first year, the Jameel Institute has concentrated on the emergency response to COVID-19. We recognised the seriousness of the crisis in mid-January 2020 when a small, rapidly convened team, developed models with data from cases in China to help forecast the potential impact on the UK and other countries. At the time, the Institute was recruiting for specific roles across the research themes. We decided to stop recruitment and redirect resources on the immediate task at hand: combating the COVID-19 outbreak. The flexible funding from Community Jameel allowed us to respond rapidly and efficiently. By the time the World Health Organisation (WHO) declared SARS-CoV-2 a global pandemic in March 2020, the Imperial College COVID-19 Response Team was established, across the Institute, under the umbrella of the Jameel Institute. The multidisciplinary team of researchers are from the School of Public Health and other departments across Imperial. At the height of the first wave in April, the team comprised of over 80 researchers. By November 2020, the team had produced 39 reports, eight tools and 21 publications.

The COVID-19 reports provide timely evidence to inform our partners in governments around the world, on the optimal policies to control the pandemic, mitigate adverse social and economic impacts, ensure a more resilient health systems response, and protect those most vulnerable. At the forefront of delivering timely analysis of the SARS-CoV-2, the Jameel Institute informed, and continues to inform, national and international policy response.

Recent reports include Report 37 (Children’s role in the COVID-19 pandemic: as systematic review of susceptibility, severity, and transmissibility, Report 38 ( SARS-CoV-2 setting- specific transmission rates: a systematic review and meta-analysis), and Report 39 (Characterising COVID-19 epidemic dynamics and mortality under-ascertainment in Khartoum, Sudan).

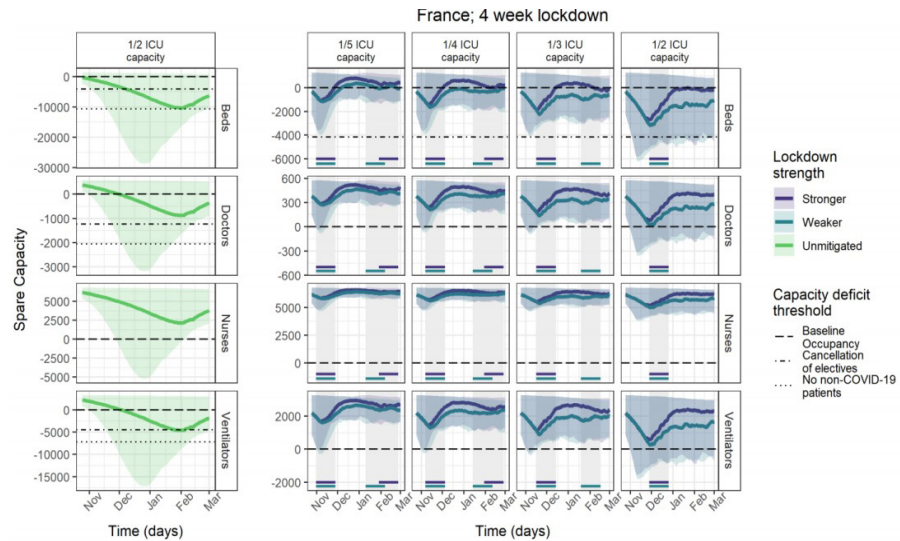
Three of the most downloaded reports by a range of audiences were:

- **Report 9** – [Impact of non-pharmaceutical interventions \(NPIs\) to reduce COVID-19 mortality and healthcare demand](#)
- **Report 13** – [Estimating the number of infections and the impact of non-pharmaceutical interventions on COVID-19 in 11 European countries](#)
- **Report 12** – [The Global Impact of COVID-19 and Strategies for Mitigation and Suppression](#)

All of the reports can be downloaded directly from the Jameel Institute website: <https://www.imperial.ac.uk/jameel-institute/covid-19/>

In addition, our Executive Committee each published reports and planning tools to support with the crisis.

Dr Katharina Hauck worked on helping health systems cope better with the COVID-19 pandemic and investigated how hospitals can increase their capacity fast to treat the surge of patients requiring life-saving treatments (Reports 15, 27 and 36 feature studies focused on this work).



Graph taken from a study (featured in Report 36) which uses an integrated model of hospital capacity planning and epidemiological projections of COVID-19 patients to estimate the spare capacity of key ICU resources under different epidemic scenarios in France, Germany and Italy during winter 2020-21

The global impact of COVID-19 has been profound, and the public health threat it represents is the most serious seen in a respiratory virus since the 1918 H1N1 influenza pandemic. In Report 9, we presented the results of epidemiological modelling which has informed policymaking in the UK and other countries in recent weeks. In the absence of a COVID-19 vaccine, we assessed the potential role of a number of public health measures – so-called non-pharmaceutical interventions (NPIs) – aimed at reducing contact rates in the population and thereby reducing transmission of the virus. In the results presented in the report, we applied a previously published microsimulation model to two countries: the UK (Great Britain specifically) and the US. We concluded that the effectiveness of any one intervention in isolation is likely to be limited, requiring multiple interventions to be combined to have a substantial impact on transmission.

Professor Kalipso Chalkidou worked on a Center for Global Development blog exploring [how militaries around the world have been feeding into the COVID-19 response](#). The pandemic has placed an unimaginable strain on health systems across the world, especially in regions that have been hit hardest. With surges in the numbers of people requiring hospitalisation and intensive care, many health systems have been temporarily overwhelmed. Some countries have utilised their armed forces to assist with the civilian response to the COVID-19 crisis. Recognising the important relationship between the military and medical institutions, a blog was published which outlined how militaries around the world – but specifically in eight European countries – have been contributing to the COVID-19 response. All eight countries we examined, used, or were approved to use, military health systems and capacity in the response to COVID-19. In all cases, we found that the military had been mobilised and was already taking part in the COVID-19 response far earlier than any official announcement of its involvement.

In work led by Professor Tim Hallett, researchers have been investigating the [potential devastating impact of the COVID-19 pandemic on HIV, TB and malaria in low- and middle-income countries](#), and the complexities to consider when communicating the risks of COVID-19.

A study on public perception and preventive behaviours adopted during the early phase of the COVID-19 pandemic in the UK, has been undertaken by Professor Helen Ward. A survey completed by 2,108 adults in March 2020, found that 77% of participants reported being worried about the COVID-19 outbreak in the UK, 93% personally took at least one measure to protect themselves from COVID-19 infection, and 71% changed their behaviour in response to government guidance ([Report 10](#)).



*Professor Helen Ward (right) discussing community engagement and strategies during the COVID-19 outbreak response in a Jameel Institute video (please see Report 10 for further information)*

The School of Public Health will be producing a report of all research and activities delivered by the Imperial COVID-19 Response Team in due course.

Professor Kalipso Chalkidou has been investigating [fairer financing of vaccines for COVID-19](#). Additionally, in work not related to COVID-19, Professor Chalkidou has been examining capacity for health economics research and practice in Jordan, Lebanon, the occupied Palestinian territories and Turkey; and prevention of non-communicable disease: best buys, wasted buys, and contestable buys.


Jameel Institute research led by Professor Majid Ezzati has resulted in a recently published report on COVID-19 excess mortality of the first wave in 21 industrialised countries (Nature Medicine, October 2020). Professor Ezzati is also investigating the role of cities in reducing the cardiovascular impacts of environmental pollution in low- and middle-income countries (BMC Medicine, 2020); anomalously warm temperatures are associated with increased injury deaths (Nature Medicine, January 2020). His team also recently produced a report on COVID-19 excess mortality during the first wave in 21 industrialised countries (Nature Medicine, October 2020).

Researchers have been conducting new epidemiologic studies of the changing outcomes of diabetes and other cardiometabolic diseases in the UK, Latin America, and worldwide. This work is led by Professor Edward Gregg who is also collaborating with other Jameel Institute work to better understand how diabetes interacts with infections to affect the long-term impact of the disease.



## Strengthening health systems

Strengthening health systems has been integral to the work we have delivered through our COVID-19 research. Health systems have been tested during this period and through our network of relationships, the Jameel Institute has been able to advise governments and help health systems to manage during this crisis. One example is the [hospital planning tool](#), which calculates how much capacity for the urgent treatment of COVID-19 patients (in terms of beds, staff, and ventilators) can be obtained with targeted interventions such as cancelling elective surgeries and re-organising care. A [webinar](#) created by Dr Katharina Hauck's team explaining the tool was viewed 1,300 times. When it was launched, there were 300 live views on the day of release alone.



The image is a screenshot of a news article from Imperial College London. The header includes the college's name and a navigation menu with options: Home, College and Campus (selected), Science, Engineering, Health, and Business. The article title is "J-IDEA launches coronavirus pandemic hospital planning tool" by Stephen Johns, dated 07 May 2020. The main image shows three panels labeled "BEDS", "STAFF", and "ESSENTIAL SUPPLIES" with corresponding icons of a hospital bed, a person, and a medical cart. To the right of the image are social media sharing options: 1 comment, Share this (Facebook), Tweet this (Twitter), Share on reddit, Share on LinkedIn, and Print this story. Below the image is a short summary: "Imperial's disease outbreak centre J-IDEA has launched a pandemic hospital planning tool to help cope with extreme surges in demand from coronavirus." and a "RELATED STORIES" section.

*Imperial news story announcing the launch of the pandemic hospital planning tool*

In addition, the team started work on a pandemic risk score, assessing countries' level of preparedness to deal with epidemics and pandemics globally. As the COVID-19 pandemic unfolds, the team observe the successes and failures of countries in responding to and containing their national epidemic in real time, and evaluate the validity of pandemic risk score metrics.

The Jameel Institute recently published a report titled [NDC Countdown 2030: worldwide trends in non-communicable disease mortality and progress towards Sustainable Development Goal target 3.4](#) (The Lancet, September 2020). This research, led by Professor Majid Ezzati, revealed that around the world, the risk of dying prematurely from often and largely preventable chronic diseases such as stroke, heart disease and stomach cancer had declined steadily over the past decade. However, it also showed that death rates from other chronic diseases such as diabetes, lung cancer, colon cancer, and liver cancer, are declining too slowly (or worsening in many countries) with the United States, China and the United Kingdom among a number of nations falling behind on global targets to cut premature deaths.

Professor Kalipso Chalkidou and her team worked on a number of projects, including two focused on healthcare systems in Ghana and China.

Ghana is one of the few African countries to enact legislation and earmark significant funding to establish universal health coverage (UHC) through the National Health Insurance Scheme, although donor funds have declined recently. Given a disproportionate level of spending on medicines, health technology assessment (HTA) can support resource allocation decisions in the face of highly constrained budgets, as commonly found in low-resource settings. The Ghanaian Ministry of Health, supported by the International Decision Support Initiative (iDSI), initiated a HTA study in 2016 to examine the cost-effectiveness of antihypertensive medicines. We aimed to summarise key insights from this work that highlights success factors beyond producing purely technical outputs. These include the need for capacity building, academic collaboration, and ongoing partnerships with a broad range of experts and stakeholders, by building on this HTA study, and with ongoing interactions with iDSI, HTAi, WHO, and others. Since then, Ghana has set up Ministry of Health (MOH) backed committees to take HTA institutionalisation forward in Ghana.

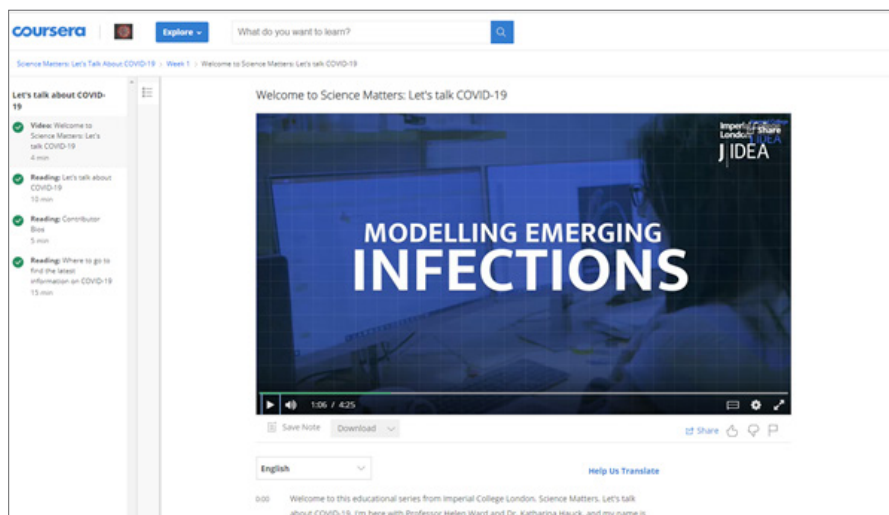
March 2018 also saw the creation of the National Health Security Administration, (NHTSA) a new ministry that took on responsibility for managing urban and rural insurance schemes (previously under different ministries) in China. In effect this is China's 'national payer' for public healthcare. This is a critical development because in 2020, national HTA leadership moved from CNHDC to a new HTA unit embedded within a think tank (the China Health Insurance Research Association – CHIRA) directly affiliated with the NHTSA. Critically, HTA now has a direct link to reimbursement and coverage decisions. Also, crucially, and supporting continuity, the HTA team draws on the staff and expertise of the former host organisation (CNHDC). iDSI will continue to work with this exciting new institutional set up and support its further development.

### **Building partnerships and capacity**

Building partnerships and capacity have been a primary focus for the Institute over the last year. We have harnessed relationships established over the years to provide information and tools to help manage and plan local responses to contain the COVID-19 pandemic.

The Jameel Institute created videos with experts responding to COVID-19 to provide real-time updates on the disease status and the potential impact, which was part of the course material for [‘Science Matters: Let’s Talk about COVID-19’](#). Participants heard directly from researchers at the Jameel Institute and other research Institutes about the theory behind the analyses of COVID-19 and its spread, while learning how to interpret new information using the core principles of public health, epidemiology, medicine, health economics, and social science. 134,000 people have enrolled in the course since April 2020 with 15,000 recent views. Dr Katharina Hauck and Professor Helen Ward led the development of the course.

Along with Community Jameel, the Jameel Institute also brought together a range of partners and stakeholders to workshop how we can apply the power of data analytics to control famine and malnutrition in East Africa, namely Ethiopia, Kenya and Somalia. The concept is to use multidisciplinary data analytics to provide accurate, high resolution, early warnings of malnutrition, to governments, intergovernmental and NGO actors, in three countries with communities that rely heavily on agriculture and are at heightened risk of malnutrition as a result of climate change.



*Coursera webpage from 'Science Matters: Let's Talk about COVID-19'*

For a summary of many of the publications that the Jameel Institute have produced or been involved in over the past year, please see the appendix.

## **The Jameel Institute – A Centre of Excellence**

Imperial College multi-faculty centres exist to galvanise a critical mass of permanent academic staff and funding, through multiple research groups, focused on a multidisciplinary theme. They provide an advantage to Imperial by creating a structure that transcends Faculty boundaries, as is required for the progression of the scientific endeavour. Their existence brings identifiable benefits regarding, for example, growth, breadth, and internal and external visibility.

Within our first year, the Jameel Institute has quickly become a Centre of Excellence. We have further developed our connections across Imperial's faculties and strengthened partnerships with governments, research institutions and communities, to develop practical and effective long-term solutions, shape health policy and deliver better quality of life for all. The Institute has already established links with the Business School and is continuing to review potential opportunities with other faculties and departments.

## **The Jameel Institute's first anniversary**

To mark the first anniversary of the Institute, the team delivered virtual communications and events to showcase the research and impact of the Jameel Institute since its inception in October 2019. Activities included short videos of each of the Executive Committee in conversation with Roshni Mehta, Communications and Project Manager, discussing their vision for the Institute. These videos were used on social media to spotlight each researcher, humanise the Jameel Institute brand and share insights about aspirations for the Institute. They have also been used to engage a range of audiences with our research themes and focus areas.

In addition, the team organised a symposium, bringing together experts who have been responding to or working on the COVID-19 pandemic. Themed 'Shaping the post-COVID-19 world', the symposium explored what we currently know about SARS-CoV-2, what are the economic and social impacts, and how can we prepare for the future. Speakers included Sir Jeremy Farrar, Professor Neil Ferguson, Professor Jonathan Haskel, Professor Esther Duflo, Dr Gita Gopinath, Dame Sally Davies, Dr John Nkengasong, and Professor Peter Smith. A total of 863 people joined the symposium which included MPs, policy makers, academics and NGOs.



*Promotional flyer for the first ever Jameel Institute annual symposium*



*L to R: Professor Timothy Hallett (The Jameel Institute, Imperial) Dame Sally Davies (Cambridge University), Professor Peter Smith (Imperial and University of York) and Dr John Nikengasong (Africa Centres for Disease Control and Prevention), discuss how the world can prepare better for pandemics*

## **The Jameel Institute wider activities**

### **Events**

Over the last year, the Jameel Institute has organised a number of events to engage a range of different audiences. These include:

#### **Launch of the Jameel Institute (October 2019)**

In October 2019, Professor Alice Gast (President of Imperial College London) and Mohammed Jameel KBE (Founder and Chairman, Community Jameel), along with others from the Jameel Institute and Community Jameel, came together at our White City Campus to celebrate the launch of the Institute. We were joined by esteemed guests including dignitaries, the private sector, and NGOs.

#### **The Department of Infectious Disease Epidemiology's annual short course on mathematical modelling for the control of infectious disease (September 2020)**

This course was delivered in a virtual two-day webinar series event featuring Professor Neil Ferguson, Dr Anne Cori, Dr Hsien Ho Lin, Dr Sheetal Silal, Professor Azra Ghani and Professor Gabriel Leung.



Professor Alice Gast and Mohammed Jameel KBE, along with others from the Jameel Institute and Community Jameel, gather at the Jameel Institute launch event in October 2019

## News coverage

Research produced by the Jameel Institute has featured in a range of media outlets, focused mainly on our COVID-19 work. The Institute has been mentioned in 28 articles by international media outlets, including an opinion piece by Professor Alice Gast which featured in the Financial Times in May 2020. The Jameel Institute has also featured in 57 Imperial News stories mainly covering the COVID-19 pandemic.

HOME WORLD UK COMPANIES TECH MARKETS CLIMATE GRAPHICS OPINION LIFE & ARTS HOW TO SPEND IT

Opinion **Disease control and prevention**

### Philanthropic funding must fill the urgent coronavirus research gap

Donors can unlock multiple, sometimes radical approaches while tolerating failures

ALICE GAST [+ Add to myFT](#)

Professor Robin Shattock, left, of Imperial College is developing a coronavirus vaccine © Imperial College/PA

A few months ago, the night before we launched the [Jameel Institute for Emergency and Disease Analytics](#) at Imperial's School of Public Health, leaders of another academic group supported by Community Jameel, this one in Massachusetts – the Jameel Poverty Action Lab, J-PAL, at MIT – were announced as the winners of the Nobel Prize in economics. It was appropriate recognition of the impact that J-PAL had already had on reducing poverty for millions of people around the world. It was also a fitting tribute to Mohammed Jameel, a philanthropist who supports academic projects that could not otherwise have thrived any other way.

Extract from Professor Alice Gast's opinion piece in the Financial Times regarding the importance of philanthropy at times of crisis

## **White City and the local community**

Thank you once again to Community Jameel for your significant contribution towards Imperial's £100m Transforming Health and Wellbeing campaign to support a new School of Public Health at our White City Campus. The new School will pioneer approaches to society's most pressing healthcare challenges in four key areas: World Health, Food and Nutrition, Community Health and Policy, and Children's Health and Wellbeing. In addition to the work of the Jameel Institute that supports World Health, the Campaign has also attracted major contributions from philanthropists such as Marit Mohn, and Humphrey Battcock, to support other key areas.

At White City, we are creating a space to expand our work and cultivate new collaborations with business and academia, as well as the local community and other partners. Our vision is to combine the skills, talent and insights of local residents, businesses and organisations with the expertise of our students, staff, partners and friends. We plan to be a long-term partner in the community that brings people together to find solutions to both local and global challenges. We are building a campus that is inclusive and engaging through our programme of regular events, projects and pop-ups at neighbourhood festivals and fun days help to share the wonder of science and technology with the local community through creative, hands-on activities. We are helping people in the community to develop their professional and leadership skills with programmes such as Agents for Change, a collaborative initiative aimed at boosting the confidence and ambition of women living locally and laying the foundations for a new women's leadership network.

Plans for the new building at White City are being finalised and completion of the building is expected by April 2023. Although the layout and interior designs of centres and institutes within the building are not yet available, the exterior design plan has been accepted by the local council and enabling works are progressing well. It is expected that procurement, mobilisation and construction will all begin in 2021.



*Architectural image of the School of Public Health Building to be built at our White City Campus*

# Appendix

## Publications

### COVID 19 – Online reports

- HA Thompson, A Mousa, A Dighe et al. SARS-CoV-2 setting-specific transmission rates: a systematic review and meta-analysis. Imperial College London; 27-11-2020, doi: <https://doi.org/10.25561/84270>
- KAM Gaythorpe, S Bhatia, T Mangal et al. Children’s role in the COVID-19 pandemic: as systematic review of susceptibility, severity, and transmissibility. Imperial College London; 25-11-2020, doi: <https://doi.org/10.25561/84220>
- R McCabe, MD Kont, N Schmit et al. Modelling ICU capacity under different epidemiological scenarios of the COVID-19 pandemic in three western European countries. Imperial College London; 16-11-2020, doi: <https://doi.org/10.25561/84003>
- D Haw, GForchini, P Christen et al. COVID-19 How can we keep schools and universities open? Differentiating closures by economic sector to optimize social and economic activity while containing SARS-CoV-2 transmission. Imperial College London; 16-11-2020, doi: <https://doi.org/10.25561/83928>
- NF Brazeau, R Verity, S Jenks et al. COVID-19 Infection Fatality Ratio Estimates from Seroprevalence. Imperial College London; 29-10-2020, doi: <https://doi.org/10.25561/83545>
- AB Hogan, P Winskill, OJ Watson et al. Modelling the allocation and impact of a COVID-19 vaccine. Imperial College London; 25-09-2020, doi: <https://doi.org/10.25561/82822>
- M Monod, A Blenkinsop, X Xi et al. Age groups that sustain resurging COVID-19 epidemics in the United States. Imperial College London; 17-09-2020, doi: <https://doi.org/10.25561/82551>
- OJ Watson, M Alhaffar, Z Mehchy et al. Estimating under-ascertainment of COVID-19 mortality: an analysis of novel data sources to provide insight into COVID-19 dynamics in Damascus, Syria. Imperial College London; 15-09-2020, doi: <https://doi.org/10.25561/82443>
- H Fu, X Xi, H Wang et al. The COVID-19 epidemic trends and control measures in mainland China. Imperial College London; 03-07-2020, doi: <https://doi.org/10.25561/80360>
- MAC Vollmer, S Radhakrishnan, MD Kont et al. The impact of the COVID-19 epidemic on all-cause attendances to emergency departments in two large London hospitals: an observational study. Imperial College London; 01-07-2020, doi: <https://doi.org/10.25561/80295>
- G Forchini, A Lochen, T Hallett et al. Excess non-COVID-19 deaths in England and Wales between 29th February and 5th June 2020. Imperial College London; 18-06-2020, doi: <https://doi.org/10.25561/79984>
- R McCabe, N Schmit, P Christen et al. Adapting hospital capacity to meet changing demands during the COVID-19 pandemic. Imperial College London; 15-06-2020, doi: <https://doi.org/10.25561/79837>
- P. Nouvellet, S Bhatia, A Cori et al. Reduction in mobility and COVID-19 transmission. Imperial College London; 08-06-2020, doi: <https://doi.org/10.25561/79643>
- A Dighe, L Cattarino, G Cuomo-Dannenburg et al. Response to COVID-19 in South Korea and implications for lifting stringent interventions. Imperial College London; 29-05-2020, doi: <https://doi.org/10.25561/79388>
- B Jeffrey, CE Walters, KE Ainslie et al. Anonymised & aggregated crowd level mobility data from mobile phones suggests initial compliance with COVID19 social distancing interventions was high & geographically consistent across UK. Imperial College London; 29-05-2020, doi: <https://doi.org/10.25561/79387>
- HJT Unwin, S Mishra, VC Bradley et al. State-level tracking of COVID-19 in the United States. Imperial College London; 21-05-2020, doi: <https://doi.org/10.25561/79231>

- P Winskill, C Whittaker, P Walker et al. Equity in response to the COVID-19 pandemic: an assessment of the direct and indirect impacts on disadvantaged and vulnerable populations in low- and lower middle-income countries. Imperial College London; 12-05-2020, doi: <https://doi.org/10.25561/78965>
- TA Mellan, HH Hoeltgebaum, S Mishra et al. Estimating COVID-19 cases and reproduction number in Brazil. Imperial College London; 08-05-2020, doi: <https://doi.org/10.25561/78872>
- MAC Vollmer, S Mishra, HJT Unwin et al. Using mobility to estimate the transmission intensity of COVID-19 in Italy: A subnational analysis with future scenarios. Imperial College London; 04-05-2020, doi: <https://doi.org/10.25561/78677>
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