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Jameel Institute

WORKSHOP REPORT

WORKSHOP ON THE ECONOMICS OF PANDEMIC PREPAREDNESS

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NOVEMBER 2024

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Foreword

Dear colleague,

The very first two-day workshop on the Economics of Pandemic Preparedness, organised jointly by Umea University, Sweden and the Jameel Institute, Imperial College London, was held in Stockholm from 19th-20th June, 2024. This interactive workshop provided a platform for sharing and discussing ongoing and future research, ideas and projects with a focus on integrated economic and epidemiological modelling tools for improving pandemic preparedness.

The Economics of Pandemic Preparedness Initiative (EPPI) team from the Jameel Institute and Umeå University, along with over 20 academics participated in the workshop. We were delighted to welcome two fantastic keynote speakers for our inaugural workshop, Edith Patouillard from WHO and Aditya Goenka from the University of Birmingham. We were also delighted to be able to sponsor two participants from middle-income countries (LMICs) to participate in the workshop, Elvira de Lara-Tuprio from Ateneo University in the Philippines, and Utkarsh Choudhary from KREA University in India.

Everyone enjoyed the workshop location near Nacka Strand close by the water, and we made the most of the long Swedish summer evenings with a lively and inclusive social program. Next year's workshop is planned for the 2nd-3rd June 2025, Nacka Strand, Stockholm. We hope to welcome many of you.

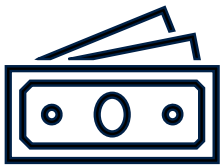
Best wishes,

Giovanni Forchini, *Professor of Econometrics, Umeå University*
Katharina Hauck, *Professor in Health Economics and Deputy Director of the Jameel Institute, Imperial College London*
Matteo Pianella, *PhD Student in Development Economics*

Workshop Structure

The sessions were organised around three broad themes critical to various aspects of pandemic preparedness and response.

Each theme covered multiple sessions wherein authors presented their work followed by a review from discussants.

1		Policy-focused modelling approaches for pandemic preparedness
2		Economic Impact of Public Health Interventions
3		Social and Behavioural Aspects of Pandemic Preparedness

Theme 1: Policy-focused modelling approaches for pandemic preparedness

The workshop focused on the increasing use of integrated economic and epidemiological modelling approaches to inform policymaking during and before pandemics. Such interdisciplinary models provide critical insights into the long-term impacts of public health interventions and enable policymakers to make informed decisions that mitigate health and economic losses during a pandemic.

Key note session

Edith Patouillard from WHO provided a comprehensive overview of the application of integrated economic-epidemiological models for policymaking. Dr Patouillard presented WHO's guide designed to assist policymakers, researchers and organisations on pandemic preparedness. Specifically, she focused on three areas:

Policymaking challenges during pandemics include managing uncertainty, conflicting objectives, and limited early data.

ole of integrated models in pandemic response by assessing the benefits and costs of policy responses, capturing heterogeneity and optimising policy response under constraints.

Enhancing the production and use of integrated modelling through four initiatives, namely, incorporating integrated models into policymaking, maintaining communication, matching policy questions of interest to appropriate models and building awareness around integrated modelling

Edith Patouillard's session provided a comprehensive overview of the importance of using integrated modelling tools to address the complex elements of policymaking during pandemics. The WHO guide equips policymakers with tools to balance health and economic outcomes whilst navigating uncertainty and optimising pandemic responses.

Key note session

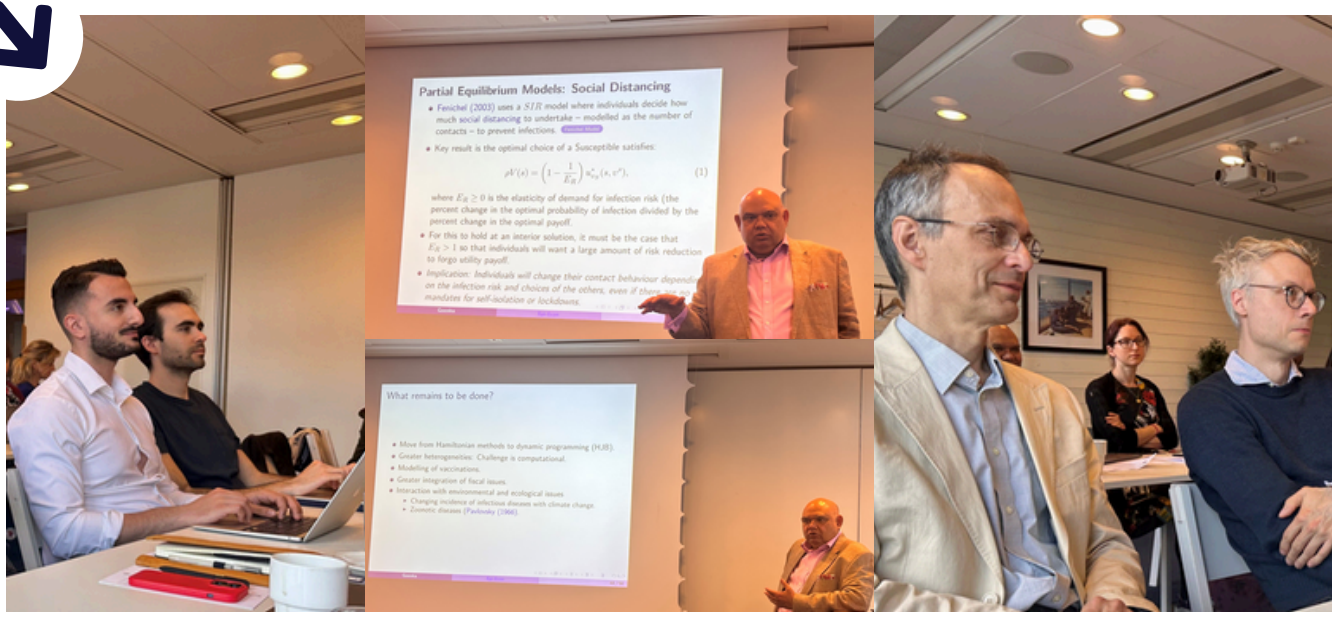
Aditya Goenka from the University of Birmingham addressed the growing complexities and challenges in integrated economic and epidemiological models to inform policymaking on pandemic preparedness. The non-convex nature of disease dynamics and the challenges associated with applying standard optimisation techniques was also discussed. The session focused on the importance of modelling both the economic impacts and disease dynamics, particularly in understanding the interaction between human behaviour and health risks. Key points covered included:

The challenge of balancing policy objectives, as economic models often focus on optimal policies, whilst infectious disease models introduce non-linearities and uncertainties.

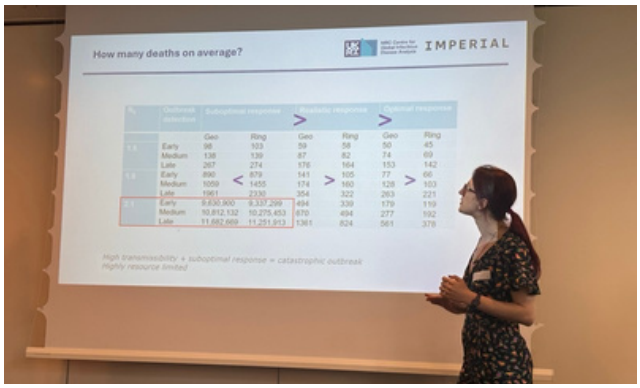
The role of externalities in determining how individual actions impact infection risk for others, and the importance of altruism in controlling disease outbreak.

The impact of mortality on labour and economic growth, and the complexities of valuing lives in economic models, emphasising the importance of modelling heterogeneities, and using value of life in policy design.

In conclusion, Aditya Goenka's session emphasised the need for real-time data integration, multi-disciplinary collaboration and use of dynamic programming approaches to develop a deeper understanding of disease dynamics to refine integrated models and enhance their utility for future health crises



Patrick Doohan from Imperial College presented an ongoing literature review, commissioned by the WHO, on the taxonomy of economic-epidemiological models , policy conclusions and their limitations. The review identified 61 papers that fit the search criteria, which explored channels of integration between economics and epidemiology, and the policies they model. Key policy findings include lockdowns impose high economic costs despite health benefits; targeted policies are more efficient than non-targeted ones although this depends on how different age groups interact; robust testing regimens offer significant welfare gains and enable safer re-opening of economies; international cooperation on policies helps mitigate externalities, and models with endogenous choices on preventive behaviour, demand and labour supply significantly impact projections. Patrick Doohan highlighted that for future work, integrated vaccination models, models with greater heterogeneity and fitting models to real-world data will be critical in the rapidly evolving field of integrated modelling.



Gemma Nedjati-Gilani from Imperial in her work on vaccination strategies against Ebola virus disease discussed the use of integrated models to determine optimal vaccination strategies for future pandemics. The study found that the optimal vaccination strategy depends on the speed and quality of response and availability of resources. Whilst ring vaccination was more effective in optimal responses, geographic vaccination performed better in resource-constraint settings, highlighting the importance of sufficient, tailored vaccine stockpiles and timely detections for controlling future outbreaks.

Steinar Holden from the University of Oslo presented an age-stratified epidemiological model for Norway to evaluate the impact of non-pharmaceutical interventions (NPIs) such as lockdowns and contact tracing to assess their health and economic costs. The work demonstrated that stringent early interventions are often most cost-effective, supporting policymakers to design future pandemic responses, although the most optimal mitigation policy which minimises health and economic costs is 'bang-bang' by nature, i.e., very strict interventions to suppress the epidemic or no intervention at all.

Theme 2: Economic Impact of Public Health Interventions

The sessions under this theme demonstrated the need for policymakers to consider both the immediate health benefits and long-term economic impacts of pandemic mitigation measures, providing examples of how integrated models can mitigate both.

Guillaume Morel from Umeå University explored how lockdowns impact disease spread, labour supply, and individual welfare using a simple transmission dynamic model. The study demonstrated that a well-timed lockdown could suppress the disease and support economic recovery by eliminating unstable cycles in consumption and infections. A lockdown which is tuned to an appropriate intensity such that it can 'hit two birds with one stone' can provide policymakers with a dual-benefit strategy.

Shirley Crankson from Brunel University used an agent-based model to simulate long-term economic and epidemiological effects of lockdowns and vaccination during the COVID-19 pandemic in Ghana. Shirley Crankson's work provided a perspective on pandemic responses in resource-constrained settings. The study found that a combination of whole-population vaccination and periodic lockdowns could reduce COVID-19 related health outcomes by over 90%, and targeted vaccination of high-risk groups could further reduce mortality by 13%. These findings provide critical insights for policymakers in Ghana, suggesting that maintaining a balance between broad and tailored interventions can offer substantial health and economic gains when resources are limited.

Elvira de Lara-Tuprio from Manila University provided a retrospective analysis of the economic costs of COVID-19 in Philippines using an integrated economic-epidemiological model to estimate losses in terms of foregone income across three phases of the pandemic. The findings show disproportionate impact on marginalised populations, highlighting the importance of using integrated models to design mitigation policies which minimise societal costs whilst protecting public health.

Theme 3: Social and Behavioural Aspects of Pandemic Preparedness

This theme's sessions addressed social and behavioural aspects of pandemic preparedness and response including vaccine hesitancy and socioeconomic inequalities.

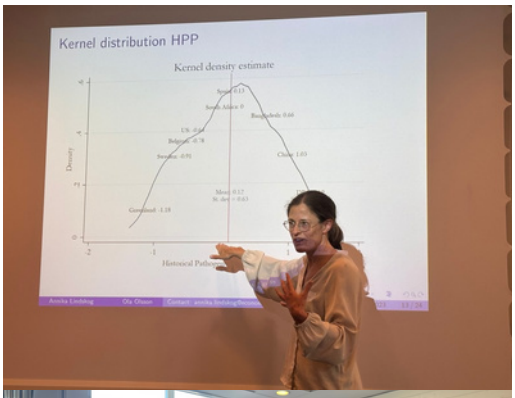
Jonatan Ribert from Stockholm University explored how a medical mishap in Sweden, where the 2009-10 Pandemrix flu vaccine was linked to narcolepsy, impacted future vaccine hesitancy. Using individual-level data, it was found that affected individuals and their families had significantly lower vaccine uptake for COVID-19, whilst some also delayed their vaccination, highlighting the long-term impact of such mishaps on public trust. Even though trust in healthcare systems has remained largely stable, the study concluded that such mishaps can have lasting impacts on the success of future vaccination campaigns.

Mirko de Maria from Imperial examined the effects of a randomised information and sensitisation intervention in Italy during the second wave of COVID-19, wherein participants in the treatment group received public health directives and a video promoting community involvement to control disease spread. The results showed that the intervention eliminated gaps in planned compliance across socio-demographic groups and improved compliance expectations for both men and women. Even though positive treatment effects on compliance expectations were seen, there were no heterogenous treatment effects in some groups. The study highlighted that perceptions on COVID-19 are malleable and health authorities could leverage that to improve compliance behaviours among populations using a tailored approach.

Annika Lindskog from the University of Gothenburg discussed her ongoing work on the role of historical pathogen prevalence (HPP) and the theory of behavioural immune system (BIS) to analyse cross-country policy variations during COVID-19. The study used regression analysis to show that a higher historical disease exposure leads to a stricter government response, especially during the first year of a health crisis due to fundamental uncertainty. It concluded that historical experiences could influence the behaviour of governments during pandemics, and its impact on public health responses.

Jule Beck from the University of Konstanz explored the impact of food insecurity during COVID on mental health using phone-based survey data from over 24,000 respondents across Mozambique, Sierra Leone, Tanzania and Uganda, particularly focusing on Generalised Anxiety Disorder (GAD). The study used an instrumental variable approach to demonstrate that food insecurity was significantly linked to increased risk of GAD. The findings suggested that even during a pandemic, addressing food insecurity as a key driver to GAD should be prioritised by policymakers whilst designing programmes to improve mental health services.

Utkarsh Choudhary from KREA University studied the impact of technology access at home on learning and educational outcomes during COVID-19 in India. Using a difference-in-differences (DID) approach with entropy balancing, the study found that access to technology in the form of internet increased reading ability and reduced dropout rates. The study highlighted the importance of bridging the digital divide to mitigate learning losses due to school closures during COVID-19, urging policymakers to ensure equitable access to technology for all students at the time of future health shocks.



Conclusions

The workshop highlighted the critical role of integrated economic and epidemiological models to support pandemic preparedness and response by balancing health and economic outcomes, especially in the face of uncertainty and limited data during early days of a pandemic. The importance of targeted intervention measures such as robust testing regimens and tailored vaccination strategies was emphasised to maximise health benefits whilst reducing economic and societal costs.

Discussions also centred around vaccine hesitancy, which can be a function of past medical mishaps, emphasising the need for clear and transparent communication strategies by policymakers to build trust. Additionally, some sessions addressed the socioeconomic inequalities exacerbated by the COVID-19 pandemic, especially in education and mental health, urging policymakers to ensure equitable access to these resources during a public health crisis.

Moving forward, it is important for key stakeholders to prioritise the use and development of integrated models in policymaking, foster international collaboration, and implement trust-building measures to improve the success of vaccination campaigns. The workshop concluded with the plans for a follow-up event from 2nd-3rd June, 2025 in Stockholm to further advance research and strategies for pandemic preparedness.