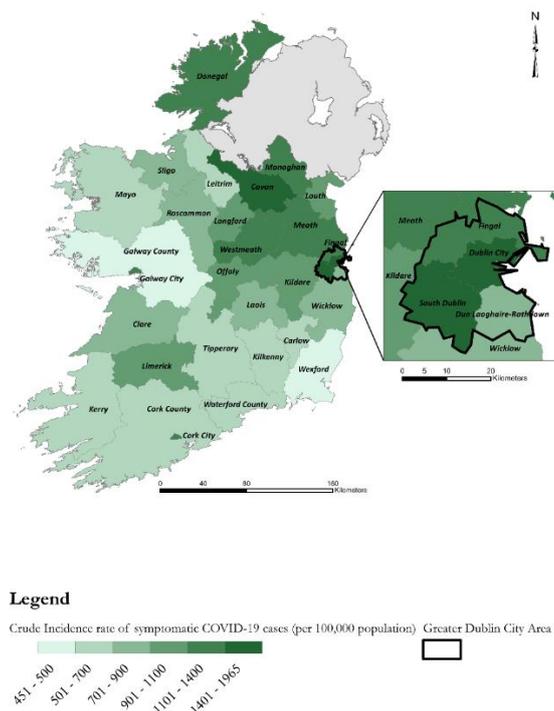


Best Post Doctoral Presentation at Environ 2021

Winner Martin Boudou, Technological University Dublin

Asthma prevalence and COVID-19 severity based on geographic location in the Republic of Ireland

The Republic of Ireland reported its first laboratory confirmed-case of the corona virus disease 2019 (COVID-19) on the February 29th 2020. As of early October 2021, approximately 255,000 confirmed infections and 5,249 deaths have been reported, thus placing unprecedented pressure on critical services.



Crude incidence rate of symptomatic cases by counties (February – November 2020) and geographic location of the greater Dublin city area in the Republic of Ireland

Within that context, the Spatio-Temporal Environmental Epidemiology Research (STEER) group, where I am currently a postdoctoral researcher, based across the Technological University of Dublin and the University College of Cork, was funded by Science Foundation of Ireland to carry out a research project on COVID-19.

To prevent potential severe outcomes of the disease, it is key to identify the clinical, socio-economic and demographic factors leading from a symptomatic case to a severe case of COVID-19 (hospitalisation, ICU admission or mortality). A series of statistical modelling & machine learning techniques (Generalised Linear Modelling & Recursive decision trees) were

applied to elucidate progression from symptomatic COVID-19 infection to hospitalization, intensive care admission and death in the Republic of Ireland from February to November 2020. Our study (<https://www.nature.com/articles/s41598-021-98008-6>) demonstrated increased model accuracy with increasing severity (i.e., increasingly biological, decreasingly behavioural) and identified recurrent predictors explaining COVID-19 severity, such as older age or the presence of underlying health conditions.

Among those underlying health conditions, chronic asthma was identified as a key risk factor. Bivariate analyses employed to identify the impact of asthma differentiated across specific settlement patterns (rural, commuter and urban areas). We identified associations between asthma and ICU admission and hospitalisation for all three settlement types (table 1). In urban areas, asthmatics were associated with an increased risk of mortality.

Bivariate analysis results between chronic asthma and COVID-19 severity in the main settlement areas of Ireland
(**NS: Non-Significant**)

Outcome	Rural areas		Commuter areas		Urban areas	
	P-value	OR	P-value	OR	P-value	OR
Hospital	<0.001	5.26	<0.001	5.16	<0.001	6.78
ICU	<0.001	13.2	<0.001	11.0	<0.001	15.5
Mortality	0.06 ^{ns}	2.50	0.09 ^{ns}	2.54	<0.001	3.08

Our findings reflect the differing nature (severity) of asthma in city centres, likely due to a combination of increased atmospheric pollution and a higher viral load due to increased population density. Moving forward, specific attention should be given to asthmatics, particularly those living in urban areas, to prevent severe outcomes of COVID-19. These findings can also be helpful for decision-making ranging from targeted risk reduction strategies and improved patient triage to evidence-based vaccination campaigns.