

RESEARCH

Emirates Aviation University
Research Newsletter



Message from the Director of Research

by *Professor Zindoga Mukandavire*

Welcome to EAU newsletter in which we share news on research activities, outputs, and other research related information.

In this issue, we spotlight recent research findings on using mathematical models to understand diabetes pathways by Dr Hannah Al Ali who is the Dean of the School of Mathematics and Data Science. This edition also includes a list of recent publications from October 2021 to February 2022.

Again, we would like to encourage all faculty to contribute to the newsletter by sharing news on your research work and sending us comments and suggestions on how we should improve future newsletter editions.

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Research Spotlight

Dr Hannah Al Ali is the Dean of the School of Mathematics and Data Science at Emirates Aviation University. She has recently completed her PhD in Mathematics at Coventry University. Dr Hannah Al Ali also holds a Master of Research from Coventry University and BSc (Honours) in Mathematics from Brunel University London. Her research interests are in Applied Mathematics, Data Science and Mathematical Modelling of diseases, with a particular focus on diabetes modelling. Her research interest in diabetes modelling is largely driven by high diabetes prevalence in the United Arab Emirates and the growing global burden of the disease.



In her recent work published in the *International Journal of Environmental Research and Public Health*, Dr Hannah Al Ali and colleagues used mathematical modelling techniques to determine suitable mathematical models for predicting glucose concentration and determine type 1 diabetes pathways using glucose concentration data for experimental mice. The findings from the study demonstrated that mathematical models without β -cells component provide a more suitable structure for modelling type 1 diabetes and predicting blood glucose concentration for hypoglycaemic episodes. These models are important in developing accurate algorithms for building machine learning predictive models, such as an artificial pancreas. Accurate and efficient artificial pancreas machines are essential for diabetes treatment, management, and control.



Dr Hannah Al Ali

“Mathematical models remain important tools to inform decision making for disease such as diabetes. The growing burden of diabetes and complications associated with COVID-19 infection call for the need to build robust mathematical models to assist in developing tools to manage or treat the disease”

Dr Hannah Al Ali will continue to build and test different mathematical model structures on diabetes to understand disease pathways and guide the development of machine learning algorithms.

Recent Publications

1. Ali H., Daneshkhah A., Boutayeb A., Mukandavire Z. Examining Type 1 Diabetes Mathematical Models Using Experimental Data. *International Journal of Environmental Research and Public Health*. 2022; 19(2):737. <https://doi.org/10.3390/ijerph19020737>
2. Murewanhema G., Mukwenha S., Dzinamarira T., Mukandavire Z., Cuadros D., Madziva R., Chingombe I., Mapingure M., Herrera H., Musuka G. Optimising COVID-19 Vaccination Policy to Mitigate SARS-CoV-2 Transmission within Schools in Zimbabwe. *Vaccines (Basel)*. 2021 Dec 15;9(12):1481. <https://doi.org/10.3390/vaccines9121481>
3. Kim H., Musuka G.N., Mukandavire Z., Branscum A., Cuadros D. F. When distance matters: Mapping HIV health care underserved communities in sub-Saharan Africa. *PLOS Glob Public Health*, 1(11): e0000013, (2021). <https://doi.org/10.1371/journal.pgph.0000013>

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