

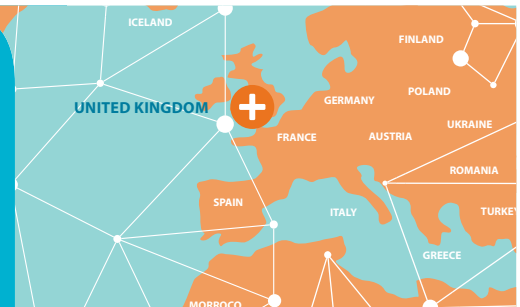
Doctors in Training Grant

PRELIMINARY REPORT



Myself (left) and a friend wearing our academic dress or “sub fusc” on matriculation day at the university

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Poor diet is now responsible for more deaths worldwide than tobacco. The largest proportion of diet-related deaths are from cardiovascular disease (CVD), which includes ischaemic heart disease and stroke. CVD remains a leading cause of death and disability in Australia, with poor diet attributed to 41.1% of all CVD. Despite advances in our understanding of and treatment of CVD, there is still uncertainty regarding what constitutes the best diet to prevent these diseases. However, there is some emerging evidence that certain dietary patterns, such as vegetarian and vegan diets, may be protective for CVD. It is possible that specific foods and nutrients within these diets have an independent effect on CVD risk or may alter CVD risk through intermediate risk factors, such as dyslipidaemia or hypertension. Identifying which foods are beneficial or harmful to cardiovascular health will provide more opportunities to modify the risk of CVD using targeted dietary interventions.

After encountering hundreds of people with chronic disease in my work as an emergency resident I became increasingly interested in the role of diet in disease prevention. I learnt more about the relationship between nutrition and health during my Master of Public Health and an internship at the World Health Organization. These experiences encouraged me to consider the critical importance of epidemiological research in informing dietary policy and clinical practice, which both have the potential to influence population-level changes in health.

I am now undertaking a Doctor of Philosophy in Population Health at the University of Oxford investigating the relationship between diet and CVD. My research is based at the Nuffield Department of Population Health, which is one of few centres worldwide with a focus on vegetarian and vegan diets.

Undertaking my DPhil here has provided me with unparalleled access to data from some of the largest cohort studies in the world. I also have the benefit of supervision from world leading experts.

My primary supervisors are Professor Tim Key, principal investigator of the European Prospective Investigation into Cancer and Nutrition (EPIC) Oxford, as well as Dr Aurora Pérez-Cornago and Dr Tammy Tong, both nutritional epidemiologists. I am surrounded by a wider community of international and multidisciplinary researchers, from biochemists to pharmacists, and cardiologists to veterinarians. A typical working day as a nutritional epidemiologist involves data analysis, writing up results for papers, attending research seminars and presentations, holding phone calls and teleconferences with international collaborators and numerous emails.

The first step of my research has been to investigate the association between specific food groups, such as fresh fruit and red meat, and blood lipids. Prior research has demonstrated vegetarians have a better blood lipid profile overall as compared to regular meat-eaters, and therefore we hypothesised that animal products have a harmful effect on blood lipid profile. The process of nutritional epidemiological analysis involves calculating daily intake of food from dietary questionnaires and using statistical tests to determine if intake of these foods is associated with different health outcomes. The analysis that I am undertaking uses data from the UK Biobank, a prospective study

of more than half a million UK men and women. This data has allowed me to look at commonly measured blood lipids, such as low-density lipoprotein and high-density lipoprotein, as well as more novel lipid protein markers, apolipoprotein A1 and apolipoprotein B.

As part of this project, I have undertaken intensive training in biostatistics and programming. Our preliminary findings suggest that certain foods, particularly meat products, may be associated with overall worse blood lipid profile. I had the opportunity to present these findings at a symposium in Oxford earlier this year.

This has led to the second stage of my thesis, where I am currently examining how macronutrients (carbohydrates, fat and protein) from different sources (animal and plant) relate to blood lipid markers. We hypothesise that different dietary sources of macronutrients, such as fat from non-dairy animal sources versus fat from plant sources, may have diverging effects on blood lipids. In order to disentangle these complex relationships, I am using a statistical technique called 'substitution analysis', which involves determining the effect of replacing a specific proportion of energy intake from one macronutrient (e.g. fat) with equivalent energy from another macronutrient (e.g. carbohydrates) on blood lipid profile. This technique allows us to model the situation you might observe in real life, whereby an individual replaces an unhealthy part of their diet with a healthier substitute. Importantly, the findings of this study may influence dietary guidelines in relation to dyslipidaemia and CVD prevention. I am currently drafting a paper for publication on these analyses in consultation with other nutritional experts from the population health and primary care departments.

Aside from my primary research, I have had opportunities to engage in projects translating dietary research into practice. More specifically, I have recently been involved in a working group to restructure the food environment at my university college, which caters to more than 500 students and their guests, for meals to be healthier and more sustainable. Through this experience I have had the privilege of mentorship from my college advisor, who is a well-known obesity researcher and the UK government's advisor on obesity.

The most exciting part of my project is yet to come. Whilst we know that overall saturated fat is harmful to cardiovascular health, unlike trans fatty acids, we have yet to introduce any restrictions for food formulation and dietary guidelines offer limited advice on how to reduce saturated fat. This is primarily because we still do not fully understand which types of individual saturated fatty acids (i.e. palmitic acid versus stearic acid) are most harmful and if their harms vary according to their dietary source (i.e. vegetable oil versus egg yolks).

I have recently been approved to access data from a large European consortium, which includes more than 500,000 participants from 23 centres across 10 European countries. Using this data I plan to explore the associations between specific individual saturated fatty acids and CVD outcomes, such as stroke and ischaemic heart disease incidence.

This will be the largest study to date to investigate these associations and we believe that the findings will fill a significant void in the current evidence and have the potential to influence international dietary guidelines and health policy.

Unfortunately, given the current COVID-19 epidemic, which is already heavily affecting the UK, my university has suspended all work on campus. In light of this, I have decided to return to Australia for the coming months to be with my family and work in our local hospital. I plan to return to the UK as soon as possible to recommence my DPhil. Following completion of my studies in 2022 I look forward to returning to Australia and completing advanced specialty training in public health. I intend to use the skills that I learn during my DPhil to work in public policy and develop population-level interventions to improve diet and health in an Australian setting.



1. The first quad at Jesus College at the University of Oxford. This is where I spend most of my spare time with other college members
2. The Richard Doll Building where the Nuffield Department for Population Health and my office are located

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