



## CASE STUDY 11: RESEARCH LINKING DIET, NUTRITION AND CARDIOMETABOLIC DISEASES WITH BIOBANK DATA

NNEdPro, in partnership with the Swiss Re Institute, has developed a research programme that is interrogating the link between diet, nutrition, other behavioural and physiological factors, and chronic disease risk, in particular cardiovascular diseases and cancer. Several large cross-sectional and prospective datasets available in the UK are being interrogated using conventional and causal inference analytical approaches, datasets currently in scope include The National Diet and Nutrition Survey (NDNS), National Survey of Health and Development (NSHD), Biobank and NHS health records and we are reviewing further inter-operable data-sets.

Biobank, for example, has collected extensive metabolic and nutritional data on 500,000 participants and, being linked with UK health records, continues to collect disease diagnosis and mortality data from participants. The current dataset has mortality data up to 2021 providing an average of 12 years of follow up data from the initial baseline measurements. Of 35,000 deaths to date, just under 5,000 are due to cardiovascular disease. Having these figures on cardiovascular disease diagnosis and mortality allows research to focus on outcomes such as disease diagnosis rather than on biomarkers such as cholesterol levels.

Using Biobank data, we have developed Cox proportional hazard models (spline terms for BMI, pictured) investigating the relationship of conventional behavioural and physiological risk factors, controlled for sex, age, smoking and deprivation with total mortality. Next steps are to examine how these relationships perform in different sub-groups; to account for the interaction of multiple risk factors; and to bring in a score measuring diet and nutrition variables. These models will then be replicated to investigate cardiovascular disease and cancer onset and morbidity.

Spline terms show the increased risk for total mortality for BMI. e.g. having a BMI of 39-40 carries around double the risk of total mortality compared to having a BMI of around 26. Different coloured splines show models for BMI alone (red) BMI controlled for: sex and age (yellow); sex, age and smoking (green) and for sex, age, smoking and deprivation (blue).

