

Empirico-inductive and/or hypothetico-deductive methods in food science and nutrition research: which one to favor for a better a global health?

Anthony Fardet^a , Louis Lebretonchel^b and Edmond Rock^a

^aINRAE, Université Clermont Auvergne, UNH, Unité de Nutrition Humaine, CRNH Auvergne, F-63000, Clermont-Ferrand, France;

^bCERREV - Centre de Recherche Risques & Vulnérabilités - EA 3918 Université de Caen Normandie MRSN, Caen Cedex 5, France

ABSTRACT

Scientific research generally follows two main methods: empirico-inductive (EI), gathering scattered, real-world qualitative/quantitative data to elaborate holistic theories, and the hypothetico-deductive (HD) approach, testing the validity of hypothesized theory in specific conditions, generally according to reductionist methodologies or designs, with the risk of over simplifying the initial complexity empirically perceived in its holistic view. However, in current food and nutrition research, new hypotheses are often elaborated from reductionist data obtained with the HD approach, and aggregated to form (ultra)reductionist theories, with no application of EI observations, limiting the applicability of these hypotheses in real life. This trend and the application of the EI method are illustrated as regards with the global health issue through the examples of food classifications/scoring, clinical studies, the definition of a sustainable diet, the “matrix effect”-related hypothesis, the concept of healthy core metabolism, and obesity prevention within the perspective of social sciences. To be efficient for producing food and nutritional data appropriable by the society, it finally appears that not only both approaches are necessary, starting with the EI method then the HD one, but also a back and forth between the two, this being not always realized, potentially leading to confusion and misunderstanding in society.

KEYWORDS

Empirico-inductive method;
hypothetico-deductive method;
food classifications;
sustainable diets;
human metabolism;
food matrix;
obesity and social sciences

Introduction

In replacement of infectious diseases, chronic disease prevalence has continually increased in the worldwide population to reach more than 72% of all deaths in 2016–2017 (Naghavi et al. 2017; Roth et al. 2018). Among them, overweight/obesity (The GBD Obesity Collaborators 2017; Ng et al. 2014), nonalcoholic fatty liver disease (Ge et al. 2020), type 2 diabetes (WHO 2016), cardiovascular diseases (Meier et al. 2019) and cancers (Roth et al. 2018) are particularly prominent contributors. Yet, global life expectancy increases worldwide (GBD 2013 Mortality and Causes of Death Collaborators 2015), and age-standardized death rates by cancers and cardiovascular diseases decrease in high income countries, this being potentially attributable to both behavioral factors (less alcohol consumption, less smoking, increased consumption of fruits and vegetables) and better medical care (increased cardiac surgeries and healthcare expenditures) (GBD 2013 Mortality and Causes of Death Collaborators 2015; Meier et al. 2019). However, years lived with disability (YLDs) from non-communicable diseases and injuries has increased since 1990 (Vos et al. 2020). In addition, 11 million premature deaths (i.e., one death among five) and 255 million disability-adjusted life-years (DALYs) were attributable worldwide to dietary risk factors in 2017 with suboptimal diet accounting for 15% of DALYs and

responsible for more deaths than any other risks globally, including tobacco smoking (Afshin et al. 2019). This may appear paradoxical as our knowledge in human nutrition, and the factors driving the diet-health relationship have reached a very high level of academic expertise, notably as exemplified through dietary guidelines by country (Herforth et al. 2019).

The discrepancy between such knowledge and the increasing prevalence of some diet-related chronic diseases has obviously many complex origins, including the one related to huge economic benefits for some unhealthy food products. However, from previous analyses, too much reductionism in nutrition and food research, notably expressed as Nutritionism (Scrinis 2013) or exclusive reductionism disconnected from reality (Fardet and Rock 2020a), might be one of the root or primary cause of such an observation; leading to the transitivity relationship between ultra-reductionism, ultra-processed foods (UPFs, the symbol of ultra-reductionist thinking applied to foods) and increase in chronic disease prevalence (Fardet and Rock 2018, 2020a), especially in countries where UPFs sales are importantly growing (FAO et al. 2019; PAHO and WHO 2019). More specifically, a more holistic approach in food and nutrition research is needed in nutrition policies – as exemplified with Brazilian dietary guidelines in 2014 (Ministry of Health of Brazil 2014) – but holistic and reductionist approaches should be complementary (Fardet and Rock