Macroeconomics and Cardiovascular Risk Factors:
The Same View through a Different Lens?

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The major risk factors for cardiovascular diseases (CVDs) have been known for at least half a century from both observational and clinical trial study designs. Despite advances in many countries, progress in prevention has been slow from a global perspective. The INTERHEART study and many epidemiologic studies have shown that the vast majority of CVD can be explained by common risk factors, including hypercholesterolaemia, hypertension, diabetes and smoking. The Global Burden of Disease (GBD) Study has led to a seismic shift in conceptualising the burden of diseases and risk factors across countries and regions, and showed that the “Western affluence” model may be flawed when considering CVDs in low-income settings, where a “dual burden” of communicable and non-communicable diseases exists. Data exists at many levels in many forms and the message of growing burden of risk factors and resultant disease is undeniable. Researchers and clinicians alike strive for better data, better study designs and better analytic methods in order to improve our knowledge of causation and prevention of CVD, which will in turn, allow us to plan the most effective strategies. However, readers are forgiven for concluding that sufficient data already exists, and that it is time for action.

In reality, science alone rarely changes hearts and minds; such change requires multi-sectoral action with “buy-in” from multiple stakeholders, including policymakers. The United Nations High Level Meeting for Non-Communicable Diseases in September 2011 focused the world’s attention on the sheer scale of global burden of cardiovascular diseases (CVDs). In the last decade, cardiovascular science, particularly epidemiology, increasingly reflects different views of CVD, its causes and its effects, in order to move from describing associations to guiding the road to action. In this respect, studies of time trends in risk factors and disease outcomes continue to be instructive, whether at national or international level. For example, the
IMPACT model has been used to explain epidemiologic transitions in CVD in several countries, by retrospectively analysing time trends and establishing the attributable impact of changes in risk factors\textsuperscript{11-13}. Such analyses have highlighted that changes in risk factors, including diet, can have relatively quick effects on disease trends, contrary to popular belief, and may guide policymakers in the prioritisation of risk factors and policies\textsuperscript{10,13}.

In this issue of Circulation, Ezzati and colleagues perform a novel, population-level analysis across 199 countries for four metabolic risk factors (body mass index, BMI; fasting plasma glucose, FPG; systolic blood pressure, SBP; and serum total cholesterol, STC) in relation to degree of social (by urbanization and Western diet) and economic development (assessed by gross domestic product, GDP) between 1980 and 2008\textsuperscript{14}. At a global and cross-country level, research including the GBD study\textsuperscript{8-9} and prior data from Ezzati and colleagues, have generally demonstrated overall increasing levels of burden of diabetes mellitus, obesity and hypertension, but with significant variations across risk factors and country-level income\textsuperscript{15-17}. In the current study, published and unpublished health examination surveys and population-based epidemiological studies were used to collate as much data as possible concerning distribution of risk factors across countries. Importantly, countries were not weighted since this analysis was focused on inter-country variation, rather than burden of disease.

At the country level, SBP, TC and BMI were positively associated with GDP and Western diet in 1980, whereas only TC remained positively associated with GDP in 2008. During the same time period, BMI remained positively associated with urbanization in both men and women, and FPG was strongly associated with BMI. The authors suggest that the latter finding may be due to an effect of urbanisation on BMI beyond income and Western diet, and
project a rising global burden of hyperglycemia and diabetes, as well as increasing levels of hypertension in low-income countries\textsuperscript{14}.

The authors are to be congratulated on the first dataset of its kind. However, one of the most striking features is paucity of global data. Across 199 countries, there were 960 data sources for BMI (17\% of all country-years, counting each source as one country-year), 786 (14\%) for SBP, 321 (5.5\%) for TC, and 370 (6.5\%) for FPG. In fact, for BMI, 15\% of countries had no data, and for TC, over 50\%\textsuperscript{14}. The authors use standard imputation techniques to model missing data but such a high degree of missing data limits the findings of the observations. In addition, the inadequacy of global surveillance data for CVD risk factors is highlighted. Of note, only Japan has an annual health examination survey. A high proportion of data regarding diet and cholesterol was missing, and the only complete dataset was GDP, which is a strong comment on the relative importance to our governments of economic versus health information. Although the authors use standard techniques for collation of dietary data, the principal component analysis method does not necessarily equate to a Western diet. Again, national collection of such survey data is patchy at best. Moreover, information regarding national smoking patterns, which are crucial in understanding disease and risk factors trends, is not available. Finally, more holistic markers than GDP, such as the Human Development Index\textsuperscript{18}, would better quantify development at a country level.

Regardless of limitations, these data and future analyses will help in describing associations between global macroeconomic changes and contemporaneous population-level risk factor distribution for CVD, especially since health-related analyses by national income have often focused on life expectancy and mortality and not on risk factors. Despite a call for “a quantitative, scientific framework to guide health-care scale-up in developing countries”, the
scale-up of NCD prevention and treatment programs is hampered by lack of measurable targets and disagreement on the policies and interventions required, which in turn are often caused by lack of compelling data\textsuperscript{19}. The need for continuing research and continuing engagement with policymakers is highlighted by the fact that the UN-HLM yielded disappointingly few “hard” targets for non-communicable diseases.

Improved surveillance systems for CVD and its risk factors are urgently required and the benefits of data linkage across economic, macroeconomic and health spheres is clear. Global data relating risk factors for CVD to macroeconomics across countries will improve our understanding of the causes and consequences of CVD and may facilitate agreement regarding targets, policies and interventions. Socioeconomic determinants are unquestionably linked with risk factors, incidence and outcomes of CVD, whether studied at local, regional, national or international level\textsuperscript{20}. Inequalities in wealth and in health are reciprocally related, and the greatest utility of the data presented by Ezzati and colleagues\textsuperscript{14} and future analyses probably lies in their galvanisation of the body of evidence for CVD prevention, as part of the longer-term agenda to improve global health inequities\textsuperscript{20}.

**Conflict of Interest Disclosures:** None.

**References:**


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