Strengthening the evidence base for nutrition and cancer in low and middle income countries

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The rapid changes in nutritional patterns and ways and conditions of life occurring in in low– and middle–income countries (LMICs) are likely to be adversely affecting the incidence and survival rates of most cancers. These rapid changes raise challenges and opportunities in research on nutrition and cancer worldwide, and highlight the need for an integrated approach to determine global strategies to better understand, prevent and control the impact these changes are having on the cancer epidemic.

Although awareness of the importance of cancer in LMICs is increasing, there is still the misperception that infectious diseases represent the primary health issue in LMICs, and that cancer risk is not preventable or modifiable, and is not strongly related to nutrition. Historically, infection–related cancers (ie, cancers of the liver, stomach, and cervix) were more common in LMICs. However, the rapid expansion of modern ways of living, dietary patterns and food production observed in LMICs, particularly among the poorest people and communities, is leading to changes in disease patterns and cancer types. Currently, the most frequently diagnosed cancers in LMICs are tumors of the lung, prostate, female breast, stomach, liver, colorectum, cervix, and oesophagus [1]. Taking a global perspective, the number of incident cancers in LMICs reached eight million in 2012 and is expected to continue to rise [1]. While the increase in cancer burden may be partly explained by demographic changes, altered ways of living and dietary factors related to globalization (eg, increased consumption of highly

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Changing patterns of diet are strong predictors of the increase in cancer and other non–communicable diseases burden in low– and middle–income countries (LMICs). The economic impact of overweight and obesity is as great as that of tobacco use.
Many LMICs are experiencing the double burden of malnutrition (coexistence of macro and micronutrient deficiency) and obesity. These changing patterns of diet, summarized as the nutrition transition, provide a window of opportunity to study the impact of these changes as determinants of the risk of cancer and other non-communicable diseases.

There is a high priority in building capacity in LMICs to study the nutritional determinants of non-communicable diseases and to undertake high quality research to support government policy.
ing assumptions and over–generalising, that can be used to help develop the protocols, train and support staff, and develop the tools and methods required for LMICs. In addition necessary financial resources must be assigned to support research needs in LMICs.

Population surveys, etiologic and intervention studies, as well as implementation research are all important in developing the evidence base to tackle the rise in cancers associated with changing dietary, and physical activity patterns and food production and availability. Repeated transversal evaluation in representative samples will enable the capture of baseline information as well as changes over time at the population level. Prospective epidemiologic cohorts have solidly established their scientific value for evaluating exogenous and endogenous exposures in relation to cancer, with primary advantages being the ability to measure exposures before the onset of disease and to evaluate numerous disease outcomes within a single study. Of the more than 50 epidemiologic cancer cohorts in the US National Cancer Institute’s Cohort Consortium, only a handful are from LMICs. Cohort studies conducted in LMICs would be a valuable resource ideally positioned for novel contributions to the understanding of cancer aetiology and survival. Some longitudinal studies have already been initiated in LMICs (such as the ones included in the Consortium of Health–Orientated Research in Transitioning Societies – COHORT [5]), and building on these initiatives may prove very informative and cost–efficient.

With technological advances and the above–mentioned matters being resolved, modern techniques (metabolomics, proteomics, transcriptomics, genome–wide association study [GWAS] and epigenome–wide association study [EWAS]) offer exciting opportunities to enhance our understanding of the dysregulation of cellular metabolism in cancer and the roles of dietary, lifestyle and environmental exposures in modulating cancer processes. Their large–scale application at a population level requires technological (eg, stable high throughput methods, bioinformatics), logistical (eg, appropriate biological samples), and statistical (eg, sufficient study power) resources. In order to facilitate the translation of such methodologies to population studies, priority should be given to the development of standardized technology for appropriate collection and long–term storage of biological samples, particularly blood and DNA, tumor specimens, associated normal tissue, urine and hair. In addition, strategies for implementing the collection, in existing or new cohorts, of stool, saliva, and other relevant biological samples that could allow studying the impact of diet on the microbiome and the latter’s role in human metabolism and disease promotion and prevention should be given serious consideration. Staff training is a vital component in the expansion and development of the use of these new technologies around the world.

We have highlighted what is required to better understand the problems and challenges facing LMICs, as well as identified some of the key requirements for solving these problems. Together with the implementation of major public health control programs (eg, tobacco control, limited consumption of sugary drinks, regulation of pesticides use), a high priority is to build capacity in LMICs to undertake high quality research and to provide high quality information to support government policy and action plans. This increased capacity is for better trained staff as well as the provision of suitable infrastructure and technical support. LMICs need the capacity to set their own research priorities and agenda based on their local needs. Building capacity requires a long–term investment, but there are short– and medium–term actions that can build capacity in an incremental way. Different research institutions and UN agencies need to coordinate and harmonize their actions to maximize the impact. A critical step is to have a better understanding of what is already in place, and where the gaps and opportunities are to begin to move forward.
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