Developing a metric of sustainable diets for low-income countries experiencing the nutrition transition
Background: The notion of a “sustainable diet” was proposed more than three decades ago in reference to a diet that adhered to common dietary guidelines for maintaining long-term health while simultaneously avoiding excessive consumption of natural resources (1). Despite this recognition of the interconnection between dietary consumption and conservation of the natural environment, defining, let alone measuring, “sustainability” has proven difficult given the diversity of disciplines that apply the concept to different domains of research and practice (e.g. agriculture, ecology, economics, urban planning, public health) (2). Applying a definition of sustainability to diets has proven particularly challenging (3). In 2010, a group of international experts proposed the following definition: “Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources” (4). Similar to the expansive definition of food security adopted two decades ago (5), this definition may be well suited as a political tool to motivate action, but its breadth and generality likely preclude its use as a guide for operationalizing metrics for sustainable diets. Yet, given the state of the global food system, the need for such metrics is perhaps greater than ever.

The technological advances of the Green Revolution have successfully increased agricultural yields over the past half century (6). Yet, an emphasis on economic efficiency and yield maximization has meant that other priorities have been neglected and that the benefits of these production gains have not been shared equitably (7). Such disparities are particularly salient in low-income countries. Dominant paradigms in development economics suggest that food systems in these countries must emphasize reducing the number of individuals engaged in farming, expanding the size of farms and the extent of commercialization, increasing yields by orders of magnitude, and integrating into the global system of trade (8). Yet these approaches rarely account for the environmental degradation that often accompanies shifts toward export-oriented industrial agriculture (9), the social displacement associated with rural transformation (10), and biophysical limits, such as finite quantities of nonrenewable resources (11). Furthermore, these approaches call for the relocation of rural residents en masse to cities (8), in many cases at a pace that may outstrip the capacity of cities to provide services to inhabitants (12). This demographic transition has been accompanied by a “nutrition transition” wherein traditional diets have shifted toward highly processed foods, and increased consumption of meat, dairy products and vegetable oils (13). This diet change has contributed to increases in oilseed monocultures, resource- and emissions-intensive livestock production (14), as well as the burden of obesity and chronic disease worldwide (15). In fact, many low- and middle-income countries now face a “double burden” of both infectious disease and non-communicable illness that has important intergenerational consequences (16). Invoking one of the most widely recognized definitions of sustainability, this public health crisis is clearly failing the health needs of the present generation while simultaneously jeopardizing the well being of future generations (17).

Any measure of sustainable diets must account for this complexity in assessing the multiple ends of a food system. However, it is not clear what domains of sustainability should be prioritized or how one should operationalize these for purposes of measurement, especially in low-income, transition countries. Indeed, few metrics of sustainable diets have been proposed (18), and none have been rigorously designed and validated for broad use. There is a critical need then, to develop a measure of diets that incorporates the salient characteristics of sustainability across the food system and that can be applied to low-income settings experiencing demographic and nutrition transitions.

Specific objectives, significance and innovation: We propose to address this critical need through a student-led, interdisciplinary research project with two specific objectives: 1) to carry out a comprehensive, systematic review of the scientific and grey literature to identify articles that characterize, define and/or measure sustainable diets; and, 2) to conduct in-depth interviews with food system stakeholders in both rural and urban regions of a low-income, transition country to acquire grounded perspectives on domains of sustainable diets. We expect that the knowledge generated through this formative research will allow us to develop an interdisciplinary survey instrument for measuring the sustainability of diets. We propose to conduct the stakeholder interviews (objective 2) in La Paz-El Alto and Santa Cruz, Bolivia, the largest and fastest growing metropolitan areas in Bolivia, and San Julian, a region experiencing high rates of land degradation as farmers have rapidly shifted to intensive, export-oriented production (19). The Bolivian context is particularly relevant to the aims of this research in that agriculture constitutes a substantial component of the economy (i.e. 40 percent of the labor force (20)), while capital-intensive agriculture is expanding, contributing to small-scale farmer vulnerability and migration to cities (21, 22). Therefore, both demographic and nutrition transitions are underway in Bolivia with important implications for the sustainability of diets that are applicable across the many countries of the Global South that are experiencing similar transitions (23). The significance of this proposed research is that it will synthesize current knowledge on the definition and measurement of sustainable diets, and contribute to the development of a novel measure for assessing sustainable diets—a measure that is currently lacking and that is critically important for advancing food systems research and
policy in low-income, transition countries. This research is innovative for its application of interdisciplinary, mixed-methods research, which links a systematic literature review with diverse stakeholder interviews, to capture both academic knowledge and lived experiences of domains of sustainability.

**Research plan:** This research will involve two components: a systematic literature review and in-depth stakeholder interviews. First, we will conduct a review of the scientific and grey literature in accordance with standard protocols (24) to identify articles that characterize, define and/or measure sustainable diets. We will construct a comprehensive list of relevant keywords and examine 14 databases that cover relevant thematic areas (e.g. nutrition, food systems, sustainability, agriculture, rural development). These databases include: Econlit, IBSS, PubMed, Web of Science, Agris, Eldis, IDEAS, IFPRI, Jolis, World Bank, FAO, WFP, WHO, CGIAR. We will also identify other articles by searching reference lists of relevant studies and contacting experts to identify relevant articles and reports. Two reviewers will independently screen the titles and abstracts of identified articles to assess their relevance for inclusion in the review as well as the quality of the research design and data presented. Faculty advisers will help to settle disagreements. The findings will be synthesized to identify the key domains in the definition and measurement of sustainable diets. Second, we will conduct semi-structured interviews with approximately 20 individuals across 5 types of stakeholders, identified using chain-referral sampling. In San Julian, this will include farmers association leaders, local government agriculture technicians, and agribusiness extension officers. In La Paz–El Alto and Santa Cruz, interviews will target nutrition and agriculture-oriented non-governmental organizations and research scientists that work in urban and rural areas. Questions will focus on how each stakeholder defines and proposes to measure sustainable diets at multiple scales, and the domains of sustainability they believe should be prioritized, based on their experience engaging with food systems in a low-income, transition country.

**Expected results and timeline:** At the completion of this project, we expect to have a comprehensive understanding of the domains that characterize the sustainability of diets. Based on the results of the literature review and complementary data collected through stakeholder interviews, we expect to draft and publish a peer-reviewed journal article, and leverage initial findings toward the development of an application for further funding to develop, pilot test, and validate a novel measure of sustainable diets. The entire team will meet in mid-May 2014 to clarify research objectives and protocols and to plan meetings throughout the summer. The literature review and stakeholder interviews will be carried out in June and July by separate student/faculty teams. Videoconference calls will be held 1-2 times during June and July among the entire team, and faculty advisers will meet independently with students as well. The entire team will hold 2-3 meetings in August and September to compile results and write a journal manuscript based on the findings. A progress report will be submitted to the Graham Institute by October 1, 2014.

**Team members and UM affiliations:** The team of students and faculty involved come from distinct units at the University of Michigan (UM). The three students are first-year graduate students who are well positioned to lead a second phase of this project, piloting and validating the measure of sustainable diets that we develop in this first phase. Lilly Fink Shapiro (School of Public Health – SPH) is studying food systems through a public health lens, has worked in food and nutrition education, is involved in a separate study of land use planning in Bolivia, and is the current program coordinator for the UM Sustainable Food Systems Group. Douglas Smith (College of Architecture and Urban Planning – CAUP) is studying environmental planning, has worked as an organic farmer and farmers market manager, and has conducted nationally recognized research on farmers markets. Ashley Green (School of Natural Resources and Environment – SNRE) researches sustainable food systems, sustainability indicators and climate change adaptation, as well as the causes of deforestation and biodiversity loss in protected areas across the globe. The faculty advisers draw from the UM Sustainable Food Systems Group, which was explicitly created to address interdisciplinary research questions centered on the global food system. Andrew Jones (SPH) studies the influence of food systems on maternal and child nutrition in low-income settings. Lesli Hoey (CAUP) conducts research and evaluations of food and nutrition planning, policies and programs. Jennifer Blesh’s (SNRE) research emphasizes soil nutrient cycling dynamics and agroecology, with recent experience developing socio-ecological indicators of sustainability on Brazilian farms.

**Budget:** Douglas (CAUP) and Ashley (SNRE) will carry out the systematic review of the literature (objective 1). We expect the review to take 6 weeks of full-time research (i.e. 2 students, each working half-time (120 hours each for a total of 240 hours) requiring $3,875.40 ($15/hr x 240 hr = $3,600 + 7.65% FICA = $3,875.40). Another $1,124.60 is needed for the price of airfare for Lilly (SPH) to travel to Bolivia to carry out the stakeholder interviews (objective 2). Professor Hoey will provide cost share for Lilly’s travel and accommodation expenses while in Bolivia as well as the additional costs associated with completing the interviews. Therefore, we are requesting in total, $5,000.
References