

Perspective: Consideration of Values When Setting Priorities in Nutrition
Research: Guidance for Transparency

Peer-reviewed author version

Hawwash, Dana; PINXTEN, Wim; AUBERT BONN, Noemie; Verstraeten,
Roosmarijn; Kolsteren, Patrick & Lachat, Carl (2018) Perspective: Consideration of
Values When Setting Priorities in Nutrition Research: Guidance for Transparency. In:
ADVANCES IN NUTRITION, 9(6), p. 671-687.

DOI: 10.1093/advances/nmy039

Handle: <http://hdl.handle.net/1942/28785>

1 **Consideration of Values when Setting Priorities in Nutrition Research: Guidance**
2 **For Transparency**

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11 Word count: 3947

12 **Number of figures:** 1; **Number of tables:** 3

13 **Short running head (26 character):** Guidance For Priority Setting

14 **Source of support:** Dana Hawwash is funded by a scholarship from Schlumberger

15 Foundation's Faculty for the Future Program (www.fftf.slb.com). There was no other
16 outside funding for this study.

17 **Conflicts of interest:** I have read the journal's policy, and the authors of this
18 manuscript have the following competing interests: CL, WP and PK are co-authors of
19 one of the priority setting exercises: *Developing a sustainable nutrition research*
20 *agenda in sub-Saharan Africa--findings from the SUNRAY project*. PLoS Med, 2014.
21 **11(1):** p. e1001593. DH funding had no role in the conduct of this study or in the
22 content of this article.

23 **Abbreviations:** Child Health and Nutrition Research Initiative (CHNRI), the Centre

24 for Disease Control and Prevention (CDC), Technical Interest Group (TIG), The

25 Australian Child and Adolescent Obesity Research Network (ACAORN), World

26 Health Organization (WHO) and the Food and Agriculture Organization of the United

Nations (FAO), The Healthy Weight Research Network (HWRN). American Society for Nutrition (ASN), Early Care and Education (ECE), Robert Wood Johnson Foundation (RWJF), National Heart, Lung and Blood Institute (NHLBI), not available (NA), Andrew Booth (AB), To Be Determined (TBD), The Office of U.S. Foreign Disaster Assistance (OFDA), National Health and Medical Research Council (NHMRC), Sub Sahara Africa (SSA). United States Department of Agriculture (USDA), Scaling Up Nutrition (SUN), Council on Health Research Development (COHRED), International Food Policy Research Institute (IFPRI)

Abstract

Nutrition research can guide interventions to tackle the burden of diet related diseases. Setting priorities in nutrition research however, requires the engagement of various stakeholders with diverse insights. Consideration of what matters most in research from a scientific, social, and ethical perspective is therefore not an automatic process. Systematic ways to explicitly define and consider relevant values are largely lacking. Here, we review existing nutrition research priority-setting exercises, analyze how values are reported and provide guidance for transparent consideration of values while setting priorities in nutrition research. Of the 27 ($n=22$ peer reviewed manuscripts and five grey literature documents) studies reviewed, 40.7% used a combination of different methods, 59.3% described the represented stakeholders, and 49.1% reported on follow-up activities. All priority-setting exercises were led by research groups based in high-income countries. Using an iterative qualitative content analysis, reported values were identified ($n=22$ manuscripts). Three clusters of values (i.e. those related to impact, feasibility and accountability) were identified. These values were organized in a tool to help those involved in setting research priorities

systematically consider and report values. The tool was finalized through an online consultation with seven international stakeholders. The value-oriented tool for priority setting in nutrition research identifies and presents values that are already implicitly and explicitly represented in priority-setting exercises. It provides guidance to enable explicit deliberation on research priorities from an ethical perspective. In addition, it can serve as a reporting tool to document how value-laden choices are made during priority setting and help foster accountability of stakeholders involved.

Key words

Nutrition, priority setting, values, guidance, tool, ethics

Introduction

Poor diets are the leading risk factor for ill health and mortality worldwide [1]. Nutrition epidemiology examines associations between diet and health, and informs actions to improve population well-being and health. Research prioritization is key to make targeted choices, optimize the global investment and accelerate progress in nutrition research in general. Research priority setting is a formal procedure of generating consensus about a set of research questions that are considered when guiding resource allocation [2]. There is no golden standard to prioritize research. Many comprehensive approaches to health research prioritization exist and provide structured as well as flexible options for stakeholders to reach consensus [3].

Transparency about values that underlie this process is key [4]. Values are “the things and events in life that people desire, aim at, wish for, or demand” [5]. A proper and systematic consideration of values during the process of priority setting exercise has the potential to improve the quality of research by enhancing relevance, uptake, and

societal impact [6, 7]. Stakeholders involved in the process come with their own values and interests [8]. Reflections on whose interests are served are relevant for readers and they enhance transparency and accountability.

Like other biomedical sciences, nutrition research needs to consider how research waste can be avoided and value can be added [9]. Considerable efforts have already been made to enhance downstream aspects of the research value chain, in particular the quality of research conduct [10] and the reporting of findings [11]. The development of up-stream processes, however, has received less attention. In particular, the governance of research via the development of practical tools to improve priority setting needs attention [9].

Scholars have called for an explicit value framework to assist stakeholders when setting health research priorities [2]. Current ethical frameworks for priority setting [2, 12-14] often pre-define values. However, the choice of these values is not justified explicitly and current frameworks are generally theoretical, without consideration of practical implementation [6].

Here, we provide guidance for the consideration of values for future priority setting exercises in nutrition research. We present a tool to enable explicit reflection and transparency on values for future priority setting exercises. The tool aims to be inclusive and builds on what is currently reported in the literature. Although it is developed for nutrition research, we consider it equally useful to other types of research that rely on broad stakeholder involvement. As a working definition, we define values as general descriptions of an interest, or of what matters (e.g. ‘honesty’),

that are not formulated in a measurable way (which we would define as a norm, e.g. ‘don’t lie’).

Methodology

A three-step approach was used to develop the guidance tool: (1) A mapping review of nutrition priority setting exercises summarized the main characteristics of the existing research priority setting exercises and reported values, (2) Values reported in the manuscripts of the mapping review were identified using qualitative content analysis and organized in a tool, and (3) The tool was submitted for comments and feedback during a consultation round with the authors of the priority setting exercises.

Step One: Mapping review of nutrition priority setting exercises

The output of a mapping review that systematically identified priority-setting exercises (e.g. in research, policy, and implementation science) in the nutrition field was used for the present study. The detailed review protocol is available elsewhere [15]. In summary, five online databases were screened including Medline (8th July 2017), ISI Web of Knowledge, Cochrane Library, and Turning Research Into Practice (TRIP) (20th July 2016) and Excerpta Medica database (EMBASE) (30th August 2016). The initial syntax was developed in Medline using the PICO (population, intervention, control, and outcomes) model [15]. The developed search syntax included MeSH terms as well as free words in the title and abstract. It included the following terms (Delphi OR “Delphi technique”[Mesh] OR “Consensus”[Mesh] OR “voting”[all fields] OR priorities OR priority OR prioritisation OR prioritization OR “priority setting” OR setting priority OR setting priorities OR agenda) AND (“Diet, food and nutrition” [MeSH] OR (nutrition OR dietary OR obese OR malnutrition OR

nutrition disorders Field: Title/Abstract) .For the other databases, the search terms were adapted and modified, and included both text words and thesaurus terms. Grey literature documents were obtained using grey literature database Grey Literature Report <http://www.greylit.org> , and targeted websites (Scaling Up Nutrition (SUN): www.scalingupnutrition.org; Thousand days: www.thousanddays.org; Council on Heath Research Development (COHRED): www.cohred.org; the Child Health and Nutrition Research Initiative (CHNRI): www.chnri.org/publications.php; International Food Policy Research Institute (IFPRI): www.ifpri.org/search?keyword=priorities; United States Department of Agriculture (USDA) Interagency Committee on Human Nutrition: www.fnrc.nal.usda.gov/surveys-reports-and-research/interagency-committee-human-nutrition-research) were searched. Moreover, external experts were consulted to identify further relevant websites and papers.

Title and abstract screening was performed for the databases' results independently by two researchers (DH and RV) against the eligibility criteria, and a third researcher (AB, see acknowledgment) was consulted in case of disagreement. Screening resulted in 133 eligible abstracts. The full report of the mapping review will be presented elsewhere. Grey literature search resulted in nine documents, while the experts' consultation resulted in two papers.

As the present study focuses on nutrition research specifically, the eligible abstracts resulting from the mapping review were screened using "research" as an additional inclusion criterion as per protocol. DH screened title and abstracts again to identify papers focused on research. Of these manuscripts, ($n=42$) were read in full by DH and CL. Finally, ($n= 22$) papers were excluded based on the exclusion criteria (nine

papers were not focused on nutrition, five were not research priorities, four papers had not used a formal priority setting method, two were not in English, and two were only abstract without a full text available. Nine grey literature documents were read in full, of which four were excluded (not explicit priority setting method used). Two papers were added through expert consultation. The first was published after the search date on December 2016 [16]. The second was not retrieved by search syntax, but was added for its relevance and importance in moving the research agenda [17]. Disagreement was resolved by discussion. A third researcher (PK) was consulted in case of doubt. Data extraction of the study characteristics was performed by DH and included: the objective, methodology used, target population, number of experts involved, and funding sources. The country of affiliation of the first author was used as a proxy to determine where the priority setting was set. Due to data saturation during qualitative data analysis, grey literature papers were not included in the qualitative analysis.

Step Two: Guidance tool development

To extract values considered when setting nutrition research priorities, retrieved papers were analyzed qualitatively [18] using NVivo Pro 11 (QSR International, Melbourne, Australia). Building on qualitative analysis, we have developed our own strategy of extracting values. Values were defined as general description of an interest/what matters through discussion guided by practices in medical ethics. The focus of the value is in general a non-measurable term in contrast to norms, which render values 'measurable'. Moreover a value during the analysis was seen as an action focused on achieving a sole purpose (i.e., an end) and not on an action carried out to achieve something further (i.e., means to an end). For example, 'education' as a value is

considered a mean to achieve a higher quality of living. Hence, ‘quality of life’ instead of ‘education’ was considered as a value during the analysis.

As a first step, a preliminary set of values was extracted by four reviewers independently (CL, WP, DH, NAB) using three randomly selected papers of the review. Second, the set of values was applied to a new set of five randomly selected papers, and the preliminary list of values was evaluated and revised until a consistent node list was reached. Finally, two researchers (DH, NAB) coded all the papers independently, including the eight papers used in developing the preliminary list of values. The two researchers then discussed differences in coding until they reached a common agreement. To ensure correct coding, a medical ethicist (WP) trained DH and NAB on how to identify values. In addition, WP assisted in the structuring of the node trees, and provided advice in case of doubt. Finally, WP also performed sample checks to safeguard the accuracy of coding.

During data comparison, similarities in the values found were resolved and the values were organized into higher categories and concepts using an iterative process. The list was simplified i.e. passages that considered means to an end as a value were excluded. Following this process of conceptualization and exclusion, the tool and list of values were further modified and simplified through frequent discussions between the reviewers (CL, WP, DH, NAB) from March to September 2017 until consensus was reached. Consistency between the tool and its source documents was ensured using regular verification of the tool and the source texts.

Step Three: Consultation round

A consultation process was conducted to assess perceptions of researchers regarding the proposed tool. The first and last authors of all the retrieved papers in step two

were contacted to provide feedback on the tool and/or comment wording. The methodology used was based on the assumption that the first author leads the work under the supervision of the principal investigator, which is often placed as the last author [19]. However, participants were encouraged to suggest other authors and scholars involved in nutrition priority setting that can provide valuable information. One email and two reminders were sent over a period of 90 days. The email was sent to 50 participants in total. Only those who replied positively were sent the tool for feedback.

Results

Characteristics of existing priority setting exercises in nutrition research

Of the 53 references identified, (Figure 1) 27 papers were eligible for data extraction. Priority setting was used to prioritize nutrition research on a wide range of topics i.e. obesity, wasting, stunting, malnutrition, and food systems, and for different age, populations and ethnicity groups (Table 1). Diverse priority setting methods were used i.e. debates and discussions, Delphi method, and the CHNRI method. A large part (11/27, 40.7%) of the methods used were a combination of the above-mentioned methods. CHNRI [20] was the most reported single method (4/27, 14.8%). All priority-setting exercises were led by research groups based in high-income countries i.e. the United States ($n=16$), eight in Europe, two in Canada, one in Australia. Although all nutrition research priority setting exercises were led by authors from high income countries, one paper was implemented in Africa [21], and two others focused on minority ethnic groups in the USA [22, 23]. Four papers [16, 24-26] reported international organizations as users of the results, without further specification.

A considerable share ($n=11$, 40.7%) of the papers did not describe stakeholders represented and/or invited clearly. More than half of the papers ($n=14$, 51.9%) did not describe follow-up activities of the proposed priorities and, of the 27 papers; five (18.5%) did not report the source of funding.

Guidance tool development

Values found in the priority setting papers (Table 2) are grouped in eight clusters i.e., understanding, impact, feasibility, efficacy, equity, soundness, sustainability, and novelty. In line with guidance on how to address research waste at large [9], research questions in table 2 are initially classified as either purely fundamental or applied. Fundamental research questions are defined as questions that attempt to increase our understanding of the topic, while applied research questions are defined as questions to be implemented in practice.

The result of the qualitative analysis served as the basis to formulate the tool (Table 3). The categorization of pure fundamental and pure applied research was removed to enhance clarity. In an attempted to make a simple tool and limit the burden on the users, the eight clusters found in table 2 were simplified through frequent discussions between the reviewers (CL, WP, DH, NAB) until consensus was reached upon the three values: ‘feasibility’, ‘impact’ and ‘accountability’. Each of the three categories has respective aspects to be considered with two columns to fill: relevance of the value for the stakeholders involved (from low to high, as well as ‘not applicable’) and decision explanation/points to consider to justify the relevance selected and to highlight certain aspects that must be considered for specific values. Moreover, each category has an empty row, to be determined, in case priority setters have the need to consider more aspects, and an empty column for more values.

The tool draws attention to the broad definitions and criteria for values found in the literature. It encourages those involved in priority settings to go beyond the simple definition of what are feasibility, impact and accountability and to consider a range of concepts much larger than a simple definition of practicality, pure effect, and responsibility. For instance, feasibility includes the ability of the proposed priority list to be answerable, realistic and supported (Table 3). Impact looks more comprehensively at other dimensions than effectiveness, including relevance, innovation, empowerment, comprehensiveness, specificity, sensitivity, accessibility and translation. Accountability is represented as a comprehensive category, emphasizing that those involved in setting priorities have a responsibility to consider what is already available as well as emerging challenges when doing research. The tool hence fosters reflection on sustainability, environmentally conscious approaches and inclusiveness when future setting priorities. We developed a manual to assist readers when using the tool [27].

Consultation round

Out of the 17 authors who replied to participate in the consultation round, seven authors provided feedback, representing scholars and leading agencies in nutrition including the Global Alliance for Improved Nutrition and the Bill & Melinda Gates Foundation. Five authors agreed to participate but did not provide input. Five authors declined to participate three due to time constraints, and two reported not having the right expertise.

In response to the feedback received, the layout of the tool was simplified. The final tool contains three categories of values for all type of research. The distinction

between fundamental and applied research was omitted as the results from the consultation rounds indicated confusion with the two categories. As a result, additional values relevant only for applied research were clarified, but mentioned alongside values relevant for both fundamental and applied research. In addition, relevance rankings were simplified to low, medium, and high relevance (as opposed to our original five level options). Other comments related to rewording of sentences, and logical ordering of values in the table were considered. One expert suggested applying each value to each prioritized question instead of the exercise as a whole. The final version of table 3 was sent for external review to the Council on Health Research for Development.

Discussion

The present research adds to the larger body of work considering how values shape agendas in nutrition. Attention towards solving malnutrition and improving nutrition has increased lately with a Decade of Action on Nutrition declared by the United Nation General Assembly in 2016 [28]. Some work has been done to set nutrition agenda setting for policy considerations for instance; Nutrition for Growth [29], and the Mainstreaming Nutrition Initiative which considered the importance of values, strategies, and actions in several countries [30]. The findings of our review call for more consistency between the values used and the reporting of the priority setting exercises. For instance, although the majority of the papers valued impact, there was an apparent lack of transparency in the reporting of the follow up plan, and outcome processes of the priority setting exercises. The tool does not assess the importance of specific values as such, nor serves as a quality stamp for research priority exercises. Rather, it aims to trigger explicit and

open-ended reflection on research, in which values can be adopted or forfeited, but not neglected. In this sense, it provides guidance and opportunity to reflect on the criteria chosen to rank the priority options proposed. The tool is proposed to complement existing priority setting methods [13, 20, 31, 32]. For instance, CHNRI proposes a pre-established list of criteria to rank research questions, while the present tool provides guidance and opportunity to take time and reflect on the criteria chosen to rank the priority options proposed.

The tool serves a double purpose. First, the tool provides a set of values that can be systematically discussed in the process of research priority setting. Second, it can also serve as a reporting instrument to increase transparency on how values were considered in the process of priority setting. As such, the guidance tool improves rational use of limited resources for research. The tool aims to draw attention on the accountability of those involved in setting research priorities and ensures due attention and transparency in values during this process. However, like any other instrument, the proposed tool will require further testing before its potential to improve priority setting is fully assessed [33].

Because the tool is built around the values that were already explicitly or implicitly reported in existing priority setting exercises in nutrition research, it is applicable to different research types, and topics. By extension, it is also applicable to other fields of biomedical research.

As values are by definition open to interpretation, the discussion on their relevance and relative priority over others is left to the discretion of those setting priorities. Even with considerable disagreement on the definition (e.g. what is meant with justice) or the implications (e.g. what does a just intervention require) of values, it still makes sense to explicitly consider all relevant values in priority setting exercises. In

323 this way, the proposed tool facilitates the process of eliciting a comprehensive debate
324 ensuring that relevant values are not ignored or that research agendas are solely
325 inspired by coincidence, practicality, or hype, rather than by a profound consideration
326 of what matters most. During the consultation round, one expert commented on the
327 level at which the tool should be applied, proposing to apply it for every question at
328 hand. Although this was a relevant suggestion, applying the tool to every research
329 option would add considerable burden to those involved in the discussions. We
330 therefore propose to apply the tool on the priority setting exercise as a whole, as it is
331 essentially meant to be a tool for debate and discussion.

332 Adequate consideration of values during the priority setting exercise requires proper
333 preparation and methodological considerations. Box 1 summarizes the conditions that
334 need to be fulfilled before starting the research prioritization. These conditions
335 correspond largely with previous recommendations to reduce research waste while
336 setting research priorities [9].

337 Although potential eligible papers in informal and unpublished reports within the
338 context of institutional settings for example were not considered, we still noted that
339 all of the research setting exercises reviewed were conducted in high-income
340 countries. Despite the high needs and limited resources; it remains unclear how, and
341 if, priority setting exercises for nutrition research in low-and middle-income countries
342 are done. This complicates inclusive and equitable approaches to global challenges in
343 nutrition, and calls for more research to understand how the research agenda is being
344 set in low- and middle-income countries. Equitable considerations of priorities from
345 local stakeholders compared to those of international researchers or donors is a
346 concern [34].

We acknowledge that the proposed tool requires testing and evaluation by various stakeholder groups to ensure its correct understanding and application. Moreover, the tool has been built and developed by researchers based on research output from high-income countries. Hence, it does not necessarily reflect the values of stakeholders in low- and middle-income countries, and further research is needed to understand values in this context. Further investigations are needed to assess understanding, applicability, and legitimacy of the tool when setting research priorities in low- and middle-income countries. We are encouraging contributions from groups who work on research prioritization and are willing to apply the tool in their process.

Acknowledgments: We like to thank Sara Abassbhay, MSc (intern Ghent University) for double checking table 1 results, Prof Andrew Booth, for support in abstract screening for the mapping review. We thank the following people for their feedback on the guidance tool Lawrence Haddad, Executive Director, Global Alliance for Improved Nutrition (GAIN), Carla D'Andreamatteo, RD, MSc The Food Lady, Sarah D. Ohlhorst, MS, RD, Senior Director of Advocacy and Science Policy American Society for Nutrition (ASN), Rockville, Maryland, USA, Shelly Sundberg, Senior Program Officer, Nutrition, Bill & Melinda Gates Foundation, Carel IJsselmuiden, COHRED

Author Contributions Conceptualization: CL DH WP. Developed search strategy: DH RV. Data curation: DH. Qualitative data analysis DH NAB WP. Drafting the tool CL DH NAB PK WP. Supervision: CL WP. Wrote the first draft of the manuscript: CL DH. Contributed to the writing of the manuscript: NAB PK WP RV. Agree with

372 the manuscript's results and conclusions: CL DH NAB PK RV WP. All authors have
373 read, and confirm that they meet ICMJE criteria for authorship.

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Tables

Table 1: Characteristics of priority setting exercises found in nutritional research

Reference	Priority methodology	Objective	Who is represented #/of experts	Target audience	Funding source	Follow-up of the results
PJ Aggett [35] UK	Debate	Complementary feeding	International Pediatric Association and European Society of Pediatric Gastroenterology, Hepatology and Nutrition. <i>N</i> = Not clear	Caregivers and policymakers, health professionals.	The Infant Food Manufacturers	NA
SK Kumanyika, et al. [23] USA	2-day workshop	Obesity	African- American researchers. <i>N</i> = <i>Not clear</i> .	The National Heart, Lung, and Blood Institute and the National Institute of health overall.	The Centre for Disease Control and Prevention CDC	Follow-up of the workshop: research project ideas, funding proposals, position papers, and presentations, and further development of a focal point to continue the dialogue.
DE Alley, et al. [36] USA	Formal presentations and informal discussions	Causes and consequences of changes in body weight and composition over the aging process.	Working Group. <i>N</i> = <i>Not clear</i> .	Researchers that address the questions mentioned in a special section of the Journal.	NA	Call for papers that address these questions for a special section of the Journal, to be published in 2009.
C Angood, et al. [24] UK	Child Health and Nutrition Research Initiative (CHNRI)	Links between wasting and stunting	18 of the 25 members of the existing Technical Interest Group facilitated by Emergency Nutrition Network took part in the survey. 16 completed the survey in full.	International agencies, research funding bodies, donors, governments and policy-makers.	USAID & the Bill & Melinda Gates Foundation	NA
C Angood, et al. [25] UK	CHNRI	The management of acute malnutrition	“Core group” of authors of the paper. <i>N</i> =64 individuals participated in the survey.	Governments, researchers, investors, international organizations, and national agencies.	USAID/ The Office of U.S. Foreign Disaster Assistance (OFDA) and Irish Aid	NA
KH Brown, et al. [37] USA	CHNRI	Zinc research in child health	A group of 7 leading experts in the field of Zinc research in child health.	Not clear.	CHNRI	Repeat periodically, possibly with a larger group and reference group of stakeholders, as new information becomes available.
IM Buzzard and YA Sievert [38] USA	A conference. The results were circulated inviting extra comments.	Dietary assessment methodology.	41 speakers participated in the conference. 3 categories of invited presenters: 1) Researchers working on research relating to dietary assessment methodology 2) Major users of dietary assessment methods 3) Policy makers. 19 of the 41 respondents gave comments for the revisions of the lists of research priorities and recommendations.	Not clear.	University of Minnesota, World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO)	Follow up conference and on-going forum to continue the process of updating and revising the priorities.

Reference	Priority methodology	Objective	Who is represented /#of experts	Target audience	Funding source	Follow-up of the results
S Byrne, et al. [39] Australia	Delphi technique (2 stages)	Longitudinal research on childhood and adolescent obesity questions	The Australian Child and Adolescent Obesity Research Network (ACAORN). In Stage 2, delegates to the 2005 conference of the Australian Society for the Study of Obesity (a scientific organization of more than 600 medical practitioners, and other health care professionals) repeated the prioritization. <i>N= Stage 1 : 32 members of ACAORN ; Stage 2 : 39 of the 75 attendees contributed.</i>	Funding bodies, researchers, medical practitioners, and medical staff.	ACAORN. A National Health and Medical Research Council (NHMRC) Australian Public Health Training Fellowship, and NHMRC Population Health Career Development Award	NA
C Curtin, et al. [40] USA	Delphi and a survey	Obesity	The Healthy Weight Research Network (HWRN) including family members, self-Advocates and policy leaders. / 1st Delphi Round <i>n= 18 / 20</i> participants provided responses. A final vote via an online survey: 75% (15/20) of HWRN members and advisors ranked the 4 most important themes.	HWRN	Resources and Services Administration Maternal and Child Health Bureau National Institute of Health	Anticipation that the research agenda will be reviewed, re-evaluated and refined as the Network evolves and matures: reaching out to the broader community of stakeholders to obtain their input.
C D'Andrea Matteo, et al. [41] Canada	Mixed-method with (i) scoping review; (ii) national online stakeholder survey (iii) key informant consultations in the form of interviews and online survey; (iv) national workshop; and (v) triangulation of textual and quantitative data	The nutrition and mental health	Canadian Institute of Health Research, Dieticians of Canada, Canadian Mental Health Association, the University of British Columbia, the University of British Columbia Behavioral Research Ethics Board. <i>N=811</i> for national online stakeholder survey; dieticians who responded (<i>n = 299</i>). <i>N= 105</i> were invited either for an interview or to complete an online key-informant questionnaire, (<i>n = 79</i>) responded. (<i>n = 16</i>) participated in a national workshop.	Dietitians .	A Planning Grant of the Canadian Institutes of Health Research, the Canadian Mental Health Association (Ontario), Dietitians of Canada, and the University of British Columbia, School of Nursing.	Integrate the findings into further development of relevant content for the Practice-based Evidence in Nutrition database and Learning on DemandTM. Long-range plans entail outlining directives that formulate these findings into actions that target training, continued education, knowledge dissemination, as well as research, advocacy, and policy initiatives.
C Lachat, et al. [21] Europe	Mixed-methods: (1) review of institutions publishing nutrition research and type of research, (2) analysis of the perceptions of nutrition research by researchers, through 3 regional workshops. (3) Assessment of the nutrition research priorities of stakeholders, and the identification of research needs for environmental challenges.	Malnutrition.	SUNRAY consortium (academics from 4 European institutions, academics from 4 universities in Africa, an international non-governmental organization, and an organization that funds research in Sub Sahara Africa (SSA)), researchers and policy makers in SSA, external stakeholders (i.e., government officials, UN agencies, NGO's, bilateral donors, and the private sector), Department for International Development (UK), with the European Commission, and during a national	NA	The European Commission	An annual course on evidence-based nutrition was piloted after SUNRAY and initiated the development of a knowledge network for evidence-based nutrition in Africa.

Reference	Priority methodology	Objective	Who is represented /#of experts	Target audience	Funding source	Follow-up of the results
RA McKinnon, et al. [42] USA	Mixed-methods: Semi structured telephone interviews. Followed by a meeting. A conference call was held by National Cancer Institute after the meeting.	Obesity	workshop in Benin for Beninese and Togolese stakeholders. 117 participants from 40 countries in SSA attended the workshops. Participants were principally senior researchers (52%) and policy makers (30%) in nutrition. The remaining participants (18%) were external stakeholders.	Knowledge generation partners and Knowledge transfer/generation partners.	No financial disclosures.	Begin the work of building the evidence base for obesity policy, by evaluating the effects of next existing policies.
AC McPherson, et al. [43] Canada	Mixed-methods: A multi-stakeholder workshop with multiple methods.	Disability and Obesity in Canadian Children Network.	Researchers; trainees; front-line clinicians; parents; former clients with disabilities; community; partners; and decision makers. Most invitees were Canadian. <i>N</i> =38 invited attendees: researchers (<i>n</i> = 12); four trainees; front-line clinicians (<i>n</i> = 12); three parents; one former clients with disabilities; three community leaders, three partners; and three decision makers.	NA	Canadian Institutes of Health Research, Holland Bloorview Kids Rehabilitation Hospital and Bloorview Research Institute.	Disability & Obesity in Canadian Children Network will be promoted across all Canadian provinces and disseminated through pan-Canadian organizations. International partners will also be encouraged to contribute their expertise to DOCC-Net and disseminate relevant information across their networks.
P Menon, et al. [44] USA	Mixed-methods: Working group, e-consultation, conference, published literature (deliberations)	A nutrition implementation-focused framework	The New York Academy of Sciences, delivery science working group, multiple stakeholders including academia, intergovernmental organizations, nongovernmental organizations, the private sector, and the public sector. <i>N</i> = Approximately 54 respondents participated in the survey.	NA	NA	NA
JM Nagata, et al. [45] USA	Modified version of the CHNRI priority setting method in three phases.	Adolescent health in low- and middle-income countries.	Experts were identified through 1- journal publications, membership of journal editorial boards, from lists of participants at WHO meetings and consultations, and by nominations from WHO departments. 2-	Donors, program managers, and researchers to stimulate and develop research in adolescent health.	US Agency for International Development and the Mary Duke Biddle Clinical Scholars Program, Stanford University	NA

Reference	Priority methodology	Objective	Who is represented /#of experts	Target audience	Funding source	Follow-up of the results
SD Ohlhorst, et al. [46] USA	Mixed-methods: In 2011 American Society for Nutrition (ASN) reached out to experts. Then, it convened a Working Group to determine the nutrition research needs and share them via ASN's member newsletter	The prevention and treatment of nutrition-related diseases.	participants at WHO meetings and consultations held in 2010 till 2015 and that were relevant to the 8 adolescent health areas through reports that were available on the WHO website and the WHO Index Medicus. 3- Representatives of the WHO departments relevant to each health area to review the lists and nominate any additional key experts in their respective fields. Overall, this resulted in 265 additional experts. <i>N</i> = Combining the list of experts resulted in a total of (<i>n</i> =450) different individuals, <i>n</i> =217 (48%) agreed to participate. In October 2015, (<i>n</i> =15) external experts joined the authors and other WHO staff in a meeting at which the methods and preliminary findings were discussed before they were finalized. 142 experts submitted questions. Scored questions by health area (<i>n</i> =130).	Stakeholders with differing areas of expertise to establish the evidence-based nutrition guidance and policies.	NA	NA
AG Ramirez, et al. [22] USA	A modified three-round web Delphi survey	To reduce and prevent Latino childhood obesity	Females and predominantly Hispanic/Latino followed by Whites, African Americans, Asians/Pacific Islanders, and other ethnicities. Most participants were academicians or researchers, followed by health educators or administrators or	Investigators, educators, health care providers, and communities to collaborate on childhood obesity prevention and control.	Robert Wood Johnson Foundation (RWJF)	Results will guide the development of a call for proposals to support 20 pilot projects aimed at identifying effective prevention and control strategies, encouraging partnerships and collaborations. It also will guide others in developing

Reference	Priority methodology	Objective	Who is represented /#of experts	Target audience	Funding source	Follow-up of the results
			managers and clinicians, and public health workers. Delphi respondents were located in 31 U.S. states. 1 st Delphi round: 579 invitations were sent, $n=177$ individuals responded. 2nd Delphi round: 103 people completed the survey, of whom $n=57$ had completed Round 1 (55.3%) and $n=46$ were new participants (44.7%). 3rd Delphi round: 194 people completed surveys, of which $n=93$ completed a survey in Round 1 and 2 (47.9%) and $n=101$ were new recruits (52.1%) from the Salud America! network.			new and innovative ecological interventions focusing on the identified research areas and priorities to fight Latino childhood obesity.
DS Ward, et al. [47] USA	Mixed-methods: Meeting, conference, online survey, voting	Identify the key issues related to obesity prevention research in Early Care and Education ECE settings.	Faculty from a variety of universities, representatives from multiple foundations interested in child obesity prevention, delegates from multiple branches of the NIH and the United States Department of Health and Human Services, and other key leaders in ECE. $N=$ Not clear how many was initially invited to the conference, there were 43 attendees. Among the 43, 44% completed the follow-up on-line survey to identify research priorities.	Funders, both federal agencies (such as National Heart, Lung and Blood Institute (NHLBI), CDC, and USDA), as well as foundations (RWJF, American Health Association, and others).	The NHLBI and Office of Behavioural and Social Sciences Research. The RWJF's Healthy Eating Research and Active Living Research programs, the Nemours Funds and the Altarum Institute. University of North Carolina's Center for Health Promotion and Disease Prevention, a member of the Prevention Research Centers Program of the CDC.	NA
CA Pratt, et al. [48] USA	Workshop	Childhood obesity prevention and treatment	Leaders and representatives from public and private academic and medical institutions with expertise in a variety of health specialties, and research methodology, staff from the NIH and the U.S. Department of Agriculture. $N=$ NA.	Investigators and funding agencies in setting research agendas for childhood obesity prevention and treatment.	NA	NA
Y Wu, et al. [49] USA	Mixed-methods: 1- A Comparative Effectiveness Review and Meta-Analysis. 2- a 3-Round Delphi process using a Web-based assessment tool.	Childhood obesity	A modified Delphi process with 6 expert stakeholders with potential interest in childhood obesity prevention such as parents, researchers, and representatives from government, public agencies. $N=$ 6.	Researchers and funding agencies.	The Agency for Healthcare Research and Quality.	NA
L Haddad, et al. [16] UK	Conclusion from compiling a report commissioned by the Global Panel on Agriculture and Food Systems for Nutrition	Food systems	$N=$ NA.	Researchers, funders, governments, Delegates to the G20 and G7 2017 meeting.	NA	NA

Reference	Priority methodology	Objective	Who is represented #/of experts	Target audience	Funding source	Follow-up of the results
RE Black, et al. [17] USA	NA	To reassess the problems of maternal and child under nutrition.	Maternal and Child Nutrition Study Group, Series Advisory Committee. <i>N= NA.</i>	NA.	Bill & Melinda Gates Foundation	NA
Bill & Melinda Gates Foundation and UK Aid [50] USA	Mixed-methods: 1- A review of existing evidence of agriculture nutrition linkages and explored research. 2- consultations with leading researchers in the field to solicit ideas of where knowledge gaps still exist.	Nutrition-sensitive agriculture.	Not clear, but they state consulting leading researchers. <i>N= NA.</i>	Researchers, policy makers, and program implementers.	UKaid, Bill & Melinda Gates foundation.	This white paper serve as the basis for a soon-to-be-announced Request for Applications from the UK Department for International Development and the Bill & Melinda Gates Foundation.
Commission of the European Communities [51] Europe	Not clear	Contribute to reducing ill health due to poor nutrition, overweight and obesity	Commission of the European Communities. <i>N= NA.</i>	Member states, private actors, international cooperation.	The European Commission.	Collaborate with the WHO to develop a nutrition and physical activity surveillance system for the EU-27. A review of obesity status progress in 2010. A Green Paper on urban transport in 2007, followed by an Action Plan in 2008. Publish guidance on sustainable urban transport plans. A White Paper on Sport. In 2007 the Commission will finance a study looking at the relationship between obesity and socio-economic status with a view to considering the most effective interventions.
The Sackler Institute for Nutrition Science [52] USA	Mixed-methods: Academy of Sciences Group identified 3 critical "Focus Areas" topics. Focus Area Working Groups developed critical gaps in knowledge. A web-based consultation for feedback followed. The conclusion was presented during a conference	Malnutrition	The Sackler Institute for Nutrition Science, academic and non-profit researchers, WHO, Humanities Global Development. Fifty-five researchers organized in Focus Area Working Groups, developed more than 20 critical gaps in knowledge from the broad Focus Areas. A web-based consultation secured feedback from more than 100 stakeholders in the nutrition science community—from both developed and developing countries—on these critical areas.	The research community and stakeholders in the field of nutrition towards focusing on pressing research needs.	The New York Academy of Sciences in partnership with the Mortimer D. Sackler.	Specific research proposals focusing on the gaps identified in this Agenda will be developed. The Sackler Institute will hold working sessions and symposiums that will bring together key stakeholders to support these projects in nutritional, agricultural, and environmental sciences; public health; and policy.
P Byrne and H Daniel [53] Europe	NA	Sustainable food and nutrition security	Joint Programming Initiative A healthy diet for a healthy life. <i>N= Not clear.</i>	All age groups.	Joint Programming Initiative.	Implementation Plan every 2 to 3 years in which the actions and activities will be carry out in the next years are presented. NA
The AFRESH Project [54] Europe	NA	I - Tackling avoidable diet- and lifestyle-related non communicable diseases	The Afresh Project 16 stakeholders from eight European regions work together. <i>N= NA.</i>	Enterprises, research organizations and regional authorities, European	The European Union's Seventh Framework Programme for Research and Technological	

Reference	Priority methodology	Objective	Who is represented /#of experts	Target audience population.	Funding source	Follow-up of the results
UNSCN [26] Europe	A review of global commitments and goals, recommendations in the 2014 Global Nutrition Report and stakeholder consultations.	II - Implementation of the European “Lisbon strategy” at the regional level. Framework for UN action in response to global and country nutrition goals for the years to come.	The UN agencies with a key mandate in nutrition – FAO, IFAD, UNICEF, WFP , and WHO. <i>N= NA</i> .	Agencies and interagency teams at global, regional and country levels.	Development. Flemish government.	NA

NA= Not Available

Table 2: Values found in the priority setting exercises in nutrition research along the priority setting cycle

Value	Pure Basic Research	Pure Applied Research
Impact	<ul style="list-style-type: none"> – Dissemination – Research translation – Timeliness – Answerability <p>[21, 23-25, 35, 36, 38-42, 44-48, 55] [49]</p>	<ul style="list-style-type: none"> - Commitment - Effectiveness - Acceptability - Community concerns and demands - Accessibility - Affordability – Education Prevention <p>[35] [23-25, 37] [21, 22, 38, 40-42, 44-47] [16, 17, 48]</p>
Understanding of the problem	<ul style="list-style-type: none"> - Long term consequences - Burden - Comprehensiveness (Global) - Quantification - Specificity <p>[23-25, 35, 36] [21, 37-45], [22, 46-49], [16, 17]</p>	
Feasibility	<p>Research infrastructure</p> <p>[23-25, 36] [38] [21, 40] [42], [43] [16, 46, 47]</p>	<p>Infrastructures</p> <ul style="list-style-type: none"> - Deliverability - Expertise - Funding - Network <p>[21, 23-25, 35, 37, 38, 40-45], [22, 46] [16, 17, 47-49]</p>
Efficacy - Cost effectiveness		<p>Applied research is carried out in the most cost effective way</p> <p>[24, 25, 41, 42, 46-48]</p>
Equity	<p>Equal opportunities for all ethnic groups to conduct research, equal inclusion of all ethnic groups and vulnerable groups in research</p>	<p>Equal opportunities for all ethnic groups to implement research, equal inclusion of all ethnic groups and vulnerable groups in</p>

Value	Pure Basic Research	Pure Applied Research
	addressing nutrition problems [23, 43]	research implementation addressing nutrition problems [23-25, 35, 37, 40], [41, 43, 45, 47-49]
Sound Methods	<ul style="list-style-type: none"> – Measurability – Validity – Appropriateness – Reliability – Standardization of definitions and cut-off – Representative – Participatory research – Social grounding and perceptions - Transparency 	Accountability Safety (do no harm) [22, 24, 25, 35-37, 44] [16, 48]
Sustainability	[16, 21-25, 35, 37-44, 47, 48] Doing research to evaluate and monitor the implemented interventions [21, 47]	Environment respect Adaptability Prevention Capacity-building Education Evaluation and monitoring [16, 21-25, 35, 37-40, 42-45, 47-49]
Novelty	Exploring new methods, new approaches and new interventions [23, 24, 37-39], [40, 43, 44] [22, 46, 47] [16, 48, 49]	

Table 3: Value oriented guidance tool for priority setting exercises

Value		Relevance	Decision / Points to Consider
FEASIBILITY			
Answerable	The research hypothesis is both clear and has the potential to be answered	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
Realistic	The infrastructure to undertake the research is considered (e.g., funding, expertise, sufficient prior knowledge, etc.)	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
	The infrastructure necessary to deliver the applied research is considered (e.g., funding, expertise, network, etc.)	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
Supported	The necessary stakeholders (e.g., government, funders, researchers) commit to the implementation	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
TBD	<i>(Empty row to add a value)</i>	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
IMPACT			
Relevant	The research advances scientific knowledge and/or practice (e.g. definition, burden, scope) and is addressed at a suitable moment in time e.g. there is a sense of urgency	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
Practice-oriented	Translation and implementation of research results are considered	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
Accessible	The accessibility of the applied research (e.g., affordability, proximity, reachability) by the target population is maximized	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
Effective	The research has the potential to achieve the desired outcomes	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
Context-sensitive	Social or cultural disapproval by the target population and demands and preferences of the target population are taken into account	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
Specific	Research is sufficiently targeted/focused to certain problems/populations/context(s)	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
Comprehensive	A wide range of relevant elements (scope, long term effects, contextual approach) are considered in the research.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
	If applied, different approaches including preventive approaches are considered	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
Empowering	The pure research enables the target population to promote their own health (e.g., through prevention, improved capacities for self-care)	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
Innovative	The research topics go beyond traditional methods, approaches and thinking around the topic	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
TBD	<i>(Empty row to add a value)</i>	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
ACCOUNTABILITY			
Reported	Dissemination of research findings beyond the research team is anticipated (e.g., publication, public presentation)	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
Transparent	Research data, methods and evidence are publicly reported	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
Sound	The research uses appropriate, valid, and reliable methods	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
Environmental Friendly	The research takes into account environmental sustainability and minimizes environmental harm	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
Cost-effective	Efficient use of resources to achieve the maximum impact	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
Sustainable	The applied research targets long-term improvements (e.g. capacity-building, adaptability)	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
Quality assured	The research has a monitoring and evaluation plan.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	
	The applied research has a monitoring and evaluation plan	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> NA	

Inclusive	The research adopts participatory approaches in which different stakeholders are represented	<input type="checkbox"/> Low	<input type="checkbox"/> Medium	<input type="checkbox"/> High	<input type="checkbox"/> NA
TBD	If it is applied research, it is not increasing inequity in society and seeks to maximize fairness (Empty row to add a value)	<input type="checkbox"/> Low	<input type="checkbox"/> Medium	<input type="checkbox"/> High	<input type="checkbox"/> NA

NA= Not Applicable TBD = To Be Determined

Figures

Fig 1: The output of the mapping review with research as extra exclusion criterion

Box 1 Prerequisites for initiating research priorities exercise

Before setting priorities, consider the following:

- Is enough known on the topic? Consider carrying out a systematic review of literature to understand the options discussed (e.g. disease burden)
- Can additional information (e.g. current developments) be provided to set priorities for research
- Are the background information and rationale communicated adequately to all priority-setting participants (e.g. briefing, training participants)?
- Are participants informed sufficiently about the procedures and use of results of the priority setting exercise? Should participants of the priority setting exercise complete an informed consent? Is the involvement of participants recognized?