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

2 **For Transparency**

3 Dana Hawwash[1], Wim Pinxten,[2] Noémie Aubert Bonn[2], Roosmarijn Verstraeten[3],

4 Patrick Kolsteren[1], Carl Lachat[1*]

5 [1] Department of Food Technology, Safety and Health, Ghent University, Ghent, Belgium;
6 [2] Faculty of Medicine and Life Sciences. Hasselt University, Hasselt, Belgium;
7 [3] Independent researcher

8 **Corresponding author:** Carl Lachat; Mailing address: Coupure links 653, 9000,

9 Gent, Belgium; Tel. +32-(0)9 264 93 77; E-mail Carl.lachat@ugent.be

10 **Last names:** Hawwash, Pinxten, Aubert Bonn, Verstraeten, Kolsteren, Lachat

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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

27 Nations (FAO), The Healthy Weight Research Network (HWRN). American Society

28 for Nutrition (ASN), Early Care and Education (ECE), Robert Wood Johnson

29 Foundation (RWJF), National Heart, Lung and Blood Institute (NHLBI), not available

30 (NA), Andrew Booth (AB), To Be Determined (TBD), The Office of U.S. Foreign

31 Disaster Assistance (OFDA), National Health and Medical Research Council

32 (NHMRC), Sub Sahara Africa (SSA). United States Department of Agriculture

33 (USDA), Scaling Up Nutrition (SUN), Council on Health Research Development

34 (COHRED), International Food Policy Research Institute (IFPRI)

35

36 **Abstract**

37 Nutrition research can guide interventions to tackle the burden of diet related diseases.

38 Setting priorities in nutrition research however, requires the engagement of various

39 stakeholders with diverse insights. Consideration of what matters most in research

40 from a scientific, social, and ethical perspective is therefore not an automatic process.

41 Systematic ways to explicitly define and consider relevant values are largely lacking.

42 Here, we review existing nutrition research priority-setting exercises, analyze how

43 values are reported and provide guidance for transparent consideration of values while

44 setting priorities in nutrition research. Of the 27 ($n=22$ peer reviewed manuscripts and

45 five grey literature documents) studies reviewed, 40.7% used a combination of

46 different methods, 59.3% described the represented stakeholders, and 49.1% reported

47 on follow-up activities. All priority-setting exercises were led by research groups

48 based in high-income countries. Using an iterative qualitative content analysis,

49 reported values were identified ($n=22$ manuscripts). Three clusters of values (i.e.

50 those related to impact, feasibility and accountability) were identified. These values

51 were organized in a tool to help those involved in setting research priorities

52   systematically consider and report values. The tool was finalized through an online

53   consultation with seven international stakeholders. The value-oriented tool for priority

54   setting in nutrition research identifies and presents values that are already implicitly

55   and explicitly represented in priority-setting exercises. It provides guidance to enable

56   explicit deliberation on research priorities from an ethical perspective. In addition, it

57   can serve as a reporting tool to document how value-laden choices are made during

58   priority setting and help foster accountability of stakeholders involved.

59
60 **Key words**
61 Nutrition, priority setting, values, guidance, tool, ethics
62
63
64 **Introduction**

65   Poor diets are the leading risk factor for ill health and mortality worldwide [1].

66   Nutrition epidemiology examines associations between diet and health, and informs

67   actions to improve population well-being and health. Research prioritization is key to

68   make targeted choices, optimize the global investment and accelerate progress in

69   nutrition research in general. Research priority setting is a formal procedure of

70   generating consensus about a set of research questions that are considered when

71   guiding resource allocation [2]. There is no golden standard to prioritize research.

72   Many comprehensive approaches to health research prioritization exist and provide

73   structured as well as flexible options for stakeholders to reach consensus [3].

74

75   Transparency about values that underlie this process is key [4]. Values are "the things

76   and events in life that people desire, aim at, wish for, or demand" [5]. A proper and

77   systematic consideration of values during the process of priority setting exercise has

78   the potential to improve the quality of research by enhancing relevance, uptake, and

79   societal impact [6, 7]. Stakeholders involved in the process come with their own

80   values and interests [8]. Reflections on whose interests are served are relevant for

81   readers and they enhance transparency and accountability.

82

83   Like other biomedical sciences, nutrition research needs to consider how research

84   waste can be avoided and value can be added [9]. Considerable efforts have already

85   been made to enhance downstream aspects of the research value chain, in particular

86   the quality of research conduct [10] and the reporting of findings [11]. The

87   development of up-stream processes, however, has received less attention. In

88   particular, the governance of research via the development of practical tools to

89   improve priority setting needs attention [9].

90

91   Scholars have called for an explicit value framework to assist stakeholders when

92   setting health research priorities [2]. Current ethical frameworks for priority setting

93   [2, 12-14] often pre-define values. However, the choice of these values is not justified

94   explicitly and current frameworks are generally theoretical, without consideration of

95   practical implementation [6].

96

97   Here, we provide guidance for the consideration of values for future priority setting

98   exercises in nutrition research. We present a tool to enable explicit reflection and

99   transparency on values for future priority setting exercises. The tool aims to be

100   inclusive and builds on what is currently reported in the literature. Although it is

101   developed for nutrition research, we consider it equally useful to other types of

102   research that rely on broad stakeholder involvement. As a working definition, we

103   define values as general descriptions of an interest, or of what matters (e.g. 'honesty'),

104   that are not formulated in a measurable way (which we would define as a norm, e.g.

105   'don't lie').

106

107   **Methodology**

108   A three-step approach was used to develop the guidance tool: (1) A mapping review

109   of nutrition priority setting exercises summarized the main characteristics of the

110   existing research priority setting exercises and reported values, (2) Values reported in

111   the manuscripts of the mapping review were identified using qualitative content

112   analysis and organized in a tool, and (3) The tool was submitted for comments and

113   feedback during a consultation round with the authors of the priority setting exercises.

114   *Step One: Mapping review of nutrition priority setting exercises*

115   The output of a mapping review that systematically identified priority-setting

116   exercises (e.g. in research, policy, and implementation science) in the nutrition field

117   was used for the present study. The detailed review protocol is available elsewhere

118   [15]. In summary, five online databases were screened including Medline (8th July

119   2017), ISI Web of Knowledge, Cochrane Library, and Turning Research Into Practice

120   (TRIP) (20th July 2016) and Excerpta Medica database (EMBASE) (30th August

121   2016). The initial syntax was developed in Medline using the PICO (population,

122   intervention, control, and outcomes) model [15]. The developed search syntax

123   included MeSH terms as well as free words in the title and abstract. It included the

124   following terms (Delphi OR "Delphi technique"[Mesh] OR "Consensus"[Mesh] OR

125   "voting"[all fields] OR priorities OR priority OR prioritisation OR prioritization OR

126   "priority setting" OR setting priority OR setting priorities OR agenda) AND ("Diet,

127   food and nutrition" [MeSH] OR (nutrition OR dietary OR obese OR malnutrition OR

128 nutrition disorders Field: Title/Abstract) .For the other databases, the search terms

129 were adapted and modified, and included both text words and thesaurus terms. Grey

130 literature documents were obtained using grey literature database Grey Literature

131 Report http://www.greylit.org , and targeted websites (Scaling Up Nutrition (SUN):

132 www.scalingupnutrition.org; Thousand days: www.thousanddays.org; Council on

133 Heath Research Development (COHRED): www.cohred.org; the Child Health and

134 Nutrition Research Initiative (CHNRI): www.chnri.org/publications.php;

135 International Food Policy Research Institute (IFPRI):

136 www.ifpri.org/search?keyword=priorities; United States Department of Agriculture

137 (USDA) Interagency Committee on Human Nutrition:

138 www.fnic.nal.usda.gov/surveys-reports-and-research/interagency-committee-human-

139 nutrition-research) were searched. Moreover, external experts were consulted to

140 identify further relevant websites and papers.

141

142 Title and abstract screening was performed for the databases' results independently by

143 two researchers (DH and RV) against the eligibility criteria, and a third researcher

144 (AB, see acknowledgment) was consulted in case of disagreement. Screening resulted

145 in 133 eligible abstracts. The full report of the mapping review will be presented

146 elsewhere. Grey literature search resulted in nine documents, while the experts'

147 consultation resulted in two papers.

148

149 As the present study focuses on nutrition research specifically, the eligible abstracts

150 resulting from the mapping review were screened using "research" as an additional

151 inclusion criterion as per protocol. DH screened title and abstracts again to identify

152 papers focused on research. Of these manuscripts, ($n=42$) were read in full by DH

153 and CL. Finally, ($n= 22$) papers were excluded based on the exclusion criteria (nine

154   papers were not focused on nutrition, five were not research priorities, four papers had

155   not used a formal priority setting method, two were not in English, and two were only

156   abstract without a full text available. Nine grey literature documents were read in full,

157   of which four were excluded (not explicit priority setting method used). Two papers

158   were added through expert consultation. The first was published after the search date

159   on December 2016 [16]. The second was not retrieved by search syntax, but was

160   added for its relevance and importance in moving the research agenda [17].

161   Disagreement was resolved by discussion. A third researcher (PK) was consulted in

162   case of doubt. Data extraction of the study characteristics was performed by DH and

163   included: the objective, methodology used, target population, number of experts

164   involved, and funding sources. The country of affiliation of the first author was used

165   as a proxy to determine where the priority setting was set. Due to data saturation

166   during qualitative data analysis, grey literature papers were not included in the

167   qualitative analysis.

168   ***Step Two: Guidance tool development***

169   To extract values considered when setting nutrition research priorities, retrieved papers

170   were analyzed qualitatively [18] using NVivo Pro 11 (QSR International, Melbourne,

171   Australia). Building on qualitative analysis, we have developed our own strategy of

172   extracting values. Values were defined as general description of an interest/what

173   matters through discussion guided by practices in medical ethics. The focus of the

174   value is in general a non-measurable term in contrast to norms, which render values

175   'measurable'. Moreover a value during the analysis was seen as an action focused on

176   achieving a sole purpose (i.e., an end) and not on an action carried out to achieve

177   something further (i.e., means to an end). For example, 'education' as a value is

178 considered a mean to achieve a higher quality of living. Hence, 'quality of life' instead

179 of 'education' was considered as a value during the analysis.

180 As a first step, a preliminary set of values was extracted by four reviewers

181 independently (CL, WP, DH, NAB) using three randomly selected papers of the

182 review. Second, the set of values was applied to a new set of five randomly selected

183 papers, and the preliminary list of values was evaluated and revised until a consistent

184 node list was reached. Finally, two researchers (DH, NAB) coded all the papers

185 independently, including the eight papers used in developing the preliminary list of

186 values. The two researchers then discussed differences in coding until they reached a

187 common agreement. To ensure correct coding, a medical ethicist (WP) trained DH and

188 NAB on how to identify values. In addition, WP assisted in the structuring of the node

189 trees, and provided advise in case of doubt. Finally, WP also performed sample checks

190 to safeguard the accuracy of coding.

191 During data comparison, similarities in the values found were resolved and the values

192 were organized into higher categories and concepts using an iterative process. The list

193 was simplified i.e. passages that considered means to an end as a value were

194 excluded. Following this process of conceptualization and exclusion, the tool and list

195 of values were further modified and simplified through frequent discussions between

196 the reviewers (CL, WP, DH, NAB) from March to September 2017 until consensus

197 was reached. Consistency between the tool and its source documents was ensured

198 using regular verification of the tool and the source texts.

199 ***Step Three: Consultation round***

200 A consultation process was conducted to assess perceptions of researchers regarding

201 the proposed tool. The first and last authors of all the retrieved papers in step two

202 were contacted to provide feedback on the tool and/or comment wording. The

203 methodology used was based on the assumption that the first author leads the work

204 under the supervision of the principal investigator, which is often placed as the last

205 author [19]. However, participants were encouraged to suggest other authors and

206 scholars involved in nutrition priority setting that can provide valuable information.

207 One email and two reminders were sent over a period of 90 days. The email was sent

208 to 50 participants in total. Only those who replied positively were sent the tool for

209 feedback.

210 **Results**

211 *Characteristics of existing priority setting exercises in nutrition research*

212 Of the 53 references identified, (Figure 1) 27 papers were eligible for data extraction.

213 Priority setting was used to prioritize nutrition research on a wide range of topics i.e.

214 obesity, wasting, stunting, malnutrition, and food systems, and for different age,

215 populations and ethnicity groups (Table 1). Diverse priority setting methods were

216 used i.e. debates and discussions, Delphi method, and the CHNRI method. A large

217 part (11/27, 40.7%) of the methods used were a combination of the above-mentioned

218 methods. CHNRI [20] was the most reported single method (4/27, 14.8%). All

219 priority-setting exercises were led by research groups based in high-income countries

220 i.e. the United States (*n=16*), eight in Europe, two in Canada, one in Australia.

221 Although all nutrition research priority setting exercises were led by authors from

222 high income countries, one paper was implemented in Africa [21], and two others

223 focused on minority ethnic groups in the USA [22, 23]. Four papers [16, 24-26]

224 reported international organizations as users of the results, without further

225 specification.

226 A considerable share (*n=11*, 40.7%) of the papers did not describe stakeholders

227 represented and/or invited clearly. More than half of the papers (*n=14*, 51.9%) did not

228 describe follow-up activities of the proposed priorities and, of the 27 papers; five

229 (18.5%) did not report the source of funding.

230 *Guidance tool development*

231 Values found in the priority setting papers (Table 2) are grouped in eight clusters i.e.,

232 understanding, impact, feasibility, efficacy, equity, soundness, sustainability, and

233 novelty. In line with guidance on how to address research waste at large [9], research

234 questions in table 2 are initially classified as either purely fundamental or applied.

235 Fundamental research questions are defined as questions that attempt to increase our

236 understanding of the topic, while applied research questions are defined as questions

237 to be implemented in practice.

238 The result of the qualitative analysis served as the basis to formulate the tool (Table

239 3). The categorization of pure fundamental and pure applied research was removed to

240 enhance clarity. In an attempted to make a simple tool and limit the burden on the

241 users, the eight clusters found in table 2 were simplified through frequent discussions

242 between the reviewers (CL, WP, DH, NAB) until consensus was reached upon the

243 three values: 'feasibility', 'impact' and 'accountability'. Each of the three categories

244 has respective aspects to be considered with two columns to fill: relevance of the

245 value for the stakeholders involved (from low to high, as well as 'not applicable') and

246 decision explanation/points to consider to justify the relevance selected and to

247 highlight certain aspects that must be considered for specific values. Moreover, each

248 category has an empty row, to be determined, in case priority setters have the need to

249 consider more aspects, and an empty column for more values.

250 The tool draws attention to the broad definitions and criteria for values found in the

251 literature. It encourages those involved in priority settings to go beyond the simple

252 definition of what are feasibility, impact and accountability and to consider a range of

253 concepts much larger than a simple definition of practicality, pure effect, and

254 responsibility. For instance, feasibility includes the ability of the proposed priority list

255 to be answerable, realistic and supported (Table 3). Impact looks more

256 comprehensively at other dimensions than effectiveness, including relevance,

257 innovation, empowerment, comprehensiveness, specificity, sensitivity, accessibility

258 and translation. Accountability is represented as a comprehensive category,

259 emphasizing that those involved in setting priorities have a responsibility to consider

260 what is already available as well as emerging challenges when doing research. The

261 tool hence fosters reflection on sustainability, environmentally conscious approaches

262 and inclusiveness when future setting priorities. We developed a manual to assist

263 readers when using the tool [27].

264 ***Consultation round***

265 Out of the 17 authors who replied to participate in the consultation round, seven

266 authors provided feedback, representing scholars and leading agencies in nutrition

267 including the Global Alliance for Improved Nutrition and the Bill & Melinda Gates

268 Foundation. Five authors agreed to participate but did not provide input. Five authors

269 declined to participate three due to time constraints, and two reported not having the

270 right expertise.

271

272 In response to the feedback received, the layout of the tool was simplified. The final

273 tool contains three categories of values for all type of research. The distinction

274 between fundamental and applied research was omitted as the results from the

275 consultation rounds indicated confusion with the two categories. As a result,

276 additional values relevant only for applied research were clarified, but mentioned

277 alongside values relevant for both fundamental and applied research. In addition,

278 relevance rankings were simplified to low, medium, and high relevance (as opposed

279 to our original five level options). Other comments related to rewording of sentences,

280 and logical ordering of values in the table were considered. One expert suggested

281 applying each value to each prioritized question instead of the exercise as a whole.

282 The final version of table 3 was sent for external review to the Council on Health

283 Research for Development.

284 **Discussion**

285 The present research adds to the larger body of work considering how values shape

286 agendas in nutrition. Attention towards solving malnutrition and improving nutrition

287 has increased lately with a Decade of Action on Nutrition declared by the United

288 Nation General Assembly in 2016 [28]. Some work has been done to set nutrition

289 agenda setting for policy considerations for instance; Nutrition for Growth [29], and

290 the Mainstreaming Nutrition Initiative which considered the importance of values,

291 strategies, and actions in several countries [30]. The findings of our review call for

292 more consistency between the values used and the reporting of the priority setting

293 exercises. For instance, although the majority of the papers valued impact, there was

294 an apparent lack of transparency in the reporting of the follow up plan, and outcome

295 processes of the priority setting exercises.

296 The tool does not assess the importance of specific values as such, nor serves as a

297 quality stamp for research priority exercises. Rather, it aims to trigger explicit and

298   open-ended reflection on research, in which values can be adopted or forfeited, but

299   not neglected. In this sense, it provides guidance and opportunity to reflect on the

300   criteria chosen to rank the priority options proposed. The tool is proposed to

301   complement existing priority setting methods [13, 20, 31, 32]. For instance, CHNRI

302   proposes a pre-established list of criteria to rank research questions, while the present

303   tool provides guidance and opportunity to take time and reflect on the criteria chosen

304   to rank the priority options proposed.

305   The tool serves a double purpose. First, the tool provides a set of values that can be

306   systematically discussed in the process of research priority setting. Second, it can also

307   serve as a reporting instrument to increase transparency on how values were

308   considered in the process of priority setting. As such, the guidance tool improves

309   rational use of limited resources for research. The tool aims to draw attention on the

310   accountability of those involved in setting research priorities and ensures due

311   attention and transparency in values during this process. However, like any other

312   instrument, the proposed tool will require further testing before its potential to

313   improve priority setting is fully assessed [33].

314   Because the tool is built around the values that were already explicitly or implicitly

315   reported in existing priority setting exercises in nutrition research, it is applicable to

316   different research types, and topics. By extension, it is also applicable to other fields

317   of biomedical research.

318   As values are by definition open to interpretation, the discussion on their relevance

319   and relative priority over others is left to the discretion of those setting priorities.

320   Even with considerable disagreement on the definition (e.g. what is meant with

321   justice) or the implications (e.g. what does a just intervention require) of values, it still

322   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].

347   We acknowledge that the proposed tool requires testing and evaluation by various

348   stakeholder groups to ensure its correct understanding and application. Moreover, the

349   tool has been built and developed by researchers based on research output from high-

350   income countries. Hence, it does not necessarily reflect the values of stakeholders in

351   low- and middle-income countries, and further research is needed to understand

352   values in this context. Further investigations are needed to assess understanding,

353   applicability, and legitimacy of the tool when setting research priorities in low- and

354   middle-income countries. We are encouraging contributions from groups who work

355   on research prioritization and are willing to apply the tool in their process.

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368   **Author Contributions** Conceptualization: CL DH WP. Developed search strategy:

369   DH RV. Data curation: DH. Qualitative data analysis DH NAB WP. Drafting the tool

370   CL DH NAB PK WP. Supervision: CL WP. Wrote the first draft of the manuscript:

371   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. *N*= 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. *N= Not clear.*	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. *N= Not clear.*	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. *N=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. *N= Stage 1 : 32 members of ACAORN ; Stage 2 : 39 of the 75 attendees contributed.*	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 *n= 18 / 20* 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'Andreamatteo, 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. *N=811 for national online stakeholder survey; dieticians who responded (n = 299). N= 105 were invited either for an interview or to complete an online key-informant questionnaire, (n = 79) responded. (n = 16) 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
			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.			
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	The participants represented a range of organizations, including academic research institutions, health organizations, private and federal research funding agencies, and state and federal government agencies. 27 participants and 11 non-government experts who had been invited to the meeting have a telephone interview.	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. *N=38* invited attendees: researchers (*n = 12*); four trainees; front-line clinicians (*n = 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. *N= 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
			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. $N=$ Combining the list of experts resulted in a total of ($n=450$) different individuals, $n=217$ (48%) agreed to participate. In October 2015, ($n=15$) 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 ($n=130$).			
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.	ASN's Public Policy Committee, scientists and researchers representing a cross-section of the Society's membership. The characteristics of the conference attendees and newsletter members are not clear. N = In September 2011 : ASN's 75 leaders developed a draft list of nutrition research needs. In February 2012 : ASN convened a Working Group. Workshop was held with nearly $n=250$ attendees. To inform and seek input from ($n=5000$) members (who didn't attend the annual meeting or workshop) the results were shared via ASN's newsletter.	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. 1st Delphi round579 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 Founds 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. N= NA.	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. N= NA.	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. N= NA.	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. N= Not clear.	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.
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. N= NA.	Enterprises, research organizations and regional authorities, European	The European Union's Seventh Framework Programme for Research and Technological	NA

Reference	Priority methodology	Objective	Who is represented /#of experts	Target audience	Funding source	Follow-up of the results
		II - Implementation of the European "Lisbon strategy" at the regional level.		population.	Development.	
UNSCN [26] Europe	A review of global commitments and goals, recommendations in the 2014 Global Nutrition Report and stakeholder consultations.	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. *N= NA.*	Agencies and interagency teams at global, regional and country levels.	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	– Dissemination – Research translation – Timeliness – Answerability [21, 23-25, 35, 36, 38-42, 44-48, 55] [49]	- Commitment - Effectiveness - Acceptability - Community concerns and demands - Accessibility - Affordability – Education Prevention [35] [23-25, 37] [21, 22, 38, 40-42, 44-47] [16, 17, 48]
Understanding of the problem	- Long term consequences - Burden - Comprehensiveness (Global) - Quantification - Specificity [23-25, 35, 36] [21, 37-45], [22, 46-49], [16, 17]	
Feasibility	Research infrastructure [23-25, 36] [38] [21, 40] [42], [43] [16, 46, 47]	Infrastructures - Deliverability - Expertise - Funding - Network [21, 23-25, 35, 37, 38, 40-45], [22, 46] [16, 17, 47-49]
Efficacy - Cost effectiveness		Applied research is carried out in the most cost effective way [24, 25, 41, 42, 46-48]
Equity	Equal opportunities for all ethnic groups to conduct research, equal inclusion of all ethnic groups and vulnerable groups in research	Equal opportunities for all ethnic groups to implement research, equal inclusion of all ethnic groups and vulnerable groups in

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	– Measurability – Validity – Appropriateness – Reliability – Standardization of definitions and cut-off – Representative – Participatory research – Social grounding and perceptions - Transparency [16, 21-25, 35, 37-44, 47, 48]	Accountability Safety (do no harm) [22, 24, 25, 35-37, 44] [16, 48]
Sustainability	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	☐ Low ☐ Medium ☐ High ☐ NA	
Realistic	The infrastructure to undertake the research is considered (e.g., funding, expertise, sufficient prior knowledge, etc.)	☐ Low ☐ Medium ☐ High ☐ NA	
	The infrastructure necessary to deliver the applied research is considered (e.g., funding, expertise, network, etc.)	☐ Low ☐ Medium ☐ High ☐ NA	
Supported	The necessary stakeholders (e.g., government, funders, researchers) commit to the implementation	☐ Low ☐ Medium ☐ High ☐ NA	
TBD	*(Empty row to add a value)*	☐ Low ☐ Medium ☐ High ☐ 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	☐ Low ☐ Medium ☐ High ☐ NA	
Practice-oriented	Translation and implementation of research results are considered	☐ Low ☐ Medium ☐ High ☐ NA	
Accessible	The accessibility of the applied research (e.g., affordability, proximity, reachability) by the target population is maximized	☐ Low ☐ Medium ☐ High ☐ NA	
Effective	The research has the potential to achieve the desired outcomes	☐ Low ☐ Medium ☐ High ☐ NA	
Context-sensitive	Social or cultural disapproval by the target population **and** demands and preferences of the target population are taken into account	☐ Low ☐ Medium ☐ High ☐ NA	
Specific	Research is sufficiently targeted/focused to certain problems/populations/contexts)	☐ Low ☐ Medium ☐ High ☐ NA	
Comprehensive	A wide range of relevant elements (scope, long term effects, contextual approach) are considered in the research.	☐ Low ☐ Medium ☐ High ☐ NA	
	If applied, different approaches including preventive approaches are considered	☐ Low ☐ Medium ☐ High ☐ NA	
Empowering	The pure research enables the target population to promote their own health (e.g., through prevention, improved capacities for self-care)	☐ Low ☐ Medium ☐ High ☐ NA	
Innovative	The research topics go beyond traditional methods, approaches and thinking around the topic	☐ Low ☐ Medium ☐ High ☐ NA	
TBD	*(Empty row to add a value)*	☐ Low ☐ Medium ☐ High ☐ NA	
ACCOUNTABILITY			
Reported	Dissemination of research findings beyond the research team is anticipated (e.g., publication, public presentation)	☐ Low ☐ Medium ☐ High ☐ NA	
Transparent	Research data, methods and evidence are publicly reported	☐ Low ☐ Medium ☐ High ☐ NA	
Sound	The research uses appropriate, valid, and reliable methods	☐ Low ☐ Medium ☐ High ☐ NA	
Environmental Friendly	The research takes into account environmental sustainability and minimizes environmental harm	☐ Low ☐ Medium ☐ High ☐ NA	
Cost-effective	Efficient use of resources to achieve the maximum impact	☐ Low ☐ Medium ☐ High ☐ NA	
Sustainable	The applied research targets long-term improvements (e.g. capacity-building, adaptability**)**	☐ Low ☐ Medium ☐ High ☐ NA	
Quality assured	The research has a monitoring and evaluation plan.	☐ Low ☐ Medium ☐ High ☐ NA	
	The applied research has a monitoring and evaluation plan		

Inclusive	The research adopts participatory approaches in which different stakeholders are represented	☐ Low ☐ Medium ☐ High ☐ NA
	If it is applied research, it is not increasing inequity in society and seeks to maximize fairness	
TBD	*(Empty row to add a value)*	☐ Low ☐ Medium ☐ High ☐ NA

NA= Not Applicable   TBD = To Be Determined

Figures

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

Boxes

<u>Box 1 Prerequisites for initiating research priorities exercise</u>

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?