Deliverable 1.3. Research protocol and analysis on the concept of evidence-informed policies

Narrative literature review

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NUTRITION RESEARCH FACILITY
Knowledge and Research for Nutrition

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The Knowledge and Research for Nutrition project of the European Commission (2020-2026) aims to provide improved knowledge and evidence for policy and programme design, management and monitoring & evaluation in order to reach better nutrition outcomes.

The project is implemented by Agrinatura - the European Alliance on Agricultural Knowledge for Development – which has established a Nutrition Research Facility, pooling expertise from European academia and having the ability to mobilise internationally renowned scientific networks and research organisations from partner countries.

The Nutrition Research Facility provides expert advice to the European Commission and to the European Union (EU) Member States and Partner Countries.

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List of Acronyms

Acronym	Description
CSO	Civil Society Organisations
EBM	Evidence-Based Medicine
EBN	Evidence-Based Nutrition
EBDM	Evidence-Based Decision-Making
EC	European Commission
EIDM	Evidence-Informed Decision-Making
EVIDENT	Health Evidence Network
FAO	Food and Agriculture Organisation
GRADE	Grading of Recommendation Assessment, Development, and Evaluation
HIC	High-Income Countries
HTA	Health Technology Assessment
KB	Knowledge Broker
LMIC	Low- and Middle-Income Countries
N4G	Nutrition for Growth
M&E	Monitoring and Evaluation
NCD	Non-Communicable Diseases
NGO	Non-Governmental Agencies
NIPN	National Information Platforms for Nutrition
NRF	Nutrition Research Facility
RCT	Randomised Controlled Trials
SDG	Sustainable Development Goals
SSA	Sub-Saharan Africa
STROBE-nut	Strengthening of Reporting of Observational Studies in Epidemiology, for Nutritional Epidemiology

SUN	Scaling Up Nutrition
SUNRAY	Sustainable Nutrition Research for Africa in the Years to Come
WCRF	World Cancer Research Fund
WHO	World Health Organisation

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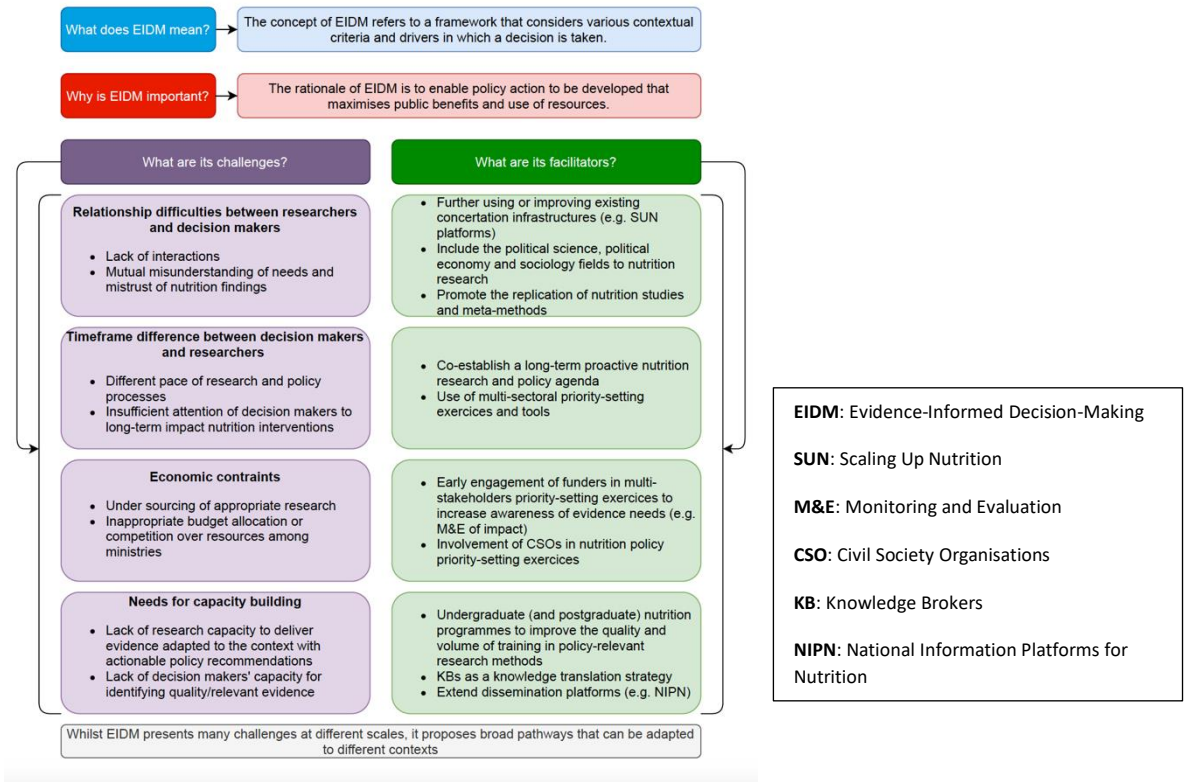
Content

Key messages

- The rationale of evidence-informed decision-making (EIDM) in the field of nutrition is to enable policy action to be developed that maximises public benefits and use of resources. The concept of EIDM refers to a framework that considers various contextual criteria and drivers (e.g. plurality of stakeholders such as decision makers and civil society organisations (CSOs), power struggles or norms and culture) in which decisions are taken. Whilst EIDM presents many challenges at different scales, it proposes broad pathways that can be adapted to different contexts.
- Challenges in relationships between decision makers and researchers can be attributed to a lack of interaction and mutual misunderstanding of what information is needed or even mistrust of findings of nutrition research. This can be addressed by further using or improving existing concertation infrastructure (e.g. SUN consultation platforms), including the political science, political economy and sociology fields to nutrition research, and promoting the replication of nutrition studies and meta-methods.
- Timeframe differences between decision makers and researchers is a barrier to EIDM and can be linked to the different pace of research and policy processes and insufficient attention of decision makers to long-term nutrition intervention impacts. It can be enhanced by co-establishing a long-term proactive nutrition research and policy agenda with the use of multi-sectoral priority-setting exercises and tools.
- Under resourcing of appropriate research and inappropriate budget allocation or competition over resources among ministries are important economic challenges. This can be addressed through early engagement of funders in multi-stakeholder nutrition research priority-setting exercises to increase awareness of evidence needs (e.g. monitoring and evaluation (M&E) of impact) and the involvement of CSOsd in nutrition policy priority-setting exercises.
- There is a need for capacity building of researchers to deliver evidence adapted to the context with actionable policy recommendations, and of decision makers (and support services) for improved identification of quality and relevant evidence. Undergraduate (and postgraduate) nutrition programmes could improve the quality and volume of training in policy-relevant research methods for nutrition. Knowledge brokers (KB) is an efficient knowledge translation strategy and dissemination platforms (e.g. National Information Platforms for Nutrition (NIPN)) should be extended.

Figure 1. Key messages of the narrative review



Executive summary

The objective of the present review was two-fold: i. to provide an overview of the current state of the art of the concept of "evidence-informed decision-making" (EIDM) for nutrition policy through an understanding of what is meant by "evidence" in nutrition science (in contrast with public health or medical "evidence"), and ii. to explore the epistemology of EIDM in relation to its use in public policies related to nutrition and the challenges and facilitators in its use.

The method used is an iterative narrative review without geographical limitations. Papers were searched on the databases "Google Scholar" and "PubMed" and key references were identified in reference lists of included papers and shared by the review team members.

The rationale of EIDM and "evidence-based decision-making" (EBDM) are frameworks that enables policy action to be justified by maximising public health benefits and use of resources. Both concepts differ depending on what is considered as scientific evidence. The EBDM framework relies only on scientific evidence, which can include or not knowledge of the environmental and organisation factors that surround decision-making. In contrast, the EIDM framework explicitly considers the various stakeholders, criteria and drivers in which decision-making occurs, for example, factors such as the public opinion, values and traditions or lived experiences, as essential drivers of successful EIDM implementation.

The explicit widened scope of EIDM reflects the evolution of modern nutrition science, as a field that goes beyond the biochemical, physiological and medical framing of nutrition to inform a clinical perspective towards a food system perspective. Hence, it requires multi-sectoral and multidisciplinary approaches to understand the diversity of drivers, barriers and needs of the different levels of analysis and their various stakeholders. Issues remain on the reliability of scientific findings in general, which particularly affects nutrition science due to numerous debates and controversies that accompany the field's evolution. Some specific difficulties impacting the reliability of nutrition findings are due to inherent characteristics of modern nutrition science and of nutrition as a multidimensional behaviour, the inadequate reporting of findings and the quality rating of nutrition evidence that relies, in the main, on ill-adapted procedures (e.g. the Grading of Recommendation Assessment, Development, and Evaluation (GRADE) approach). Recent initiatives such as NutriGrade and STROBE-nut aim to palliate these difficulties by, respectively, helping to improve the evaluation of the quality of nutrition evidence and its reporting, but are still poorly used and adopted to date.

Several challenges to implementing EIDM in the nutrition field have been identified. The lack of credibility in nutrition findings reported among the general public negatively affects the relationship between decision makers and researchers. In addition, this relationship is also impacted by disparities and misunderstanding of both communities' referential (i.e. rules and norms), needs and requirements, such as a difference in pace of the research and policy processes, the political economy or the benefits of nutrition interventions that address the underlying determinants of malnutrition (« nutrition-sensitive » interventions). Successful cooperation for policy building needs to be accompanied by mutual flexibility for co-establishing a nutrition research and policy agenda. Economic constraints are also heavy barriers to successful EIDM implementation, such as insufficient budget allocation to research providing intervention-related knowledge to support EIDM or lack of interest from funders in financing monitoring and evaluation (M&E) research (partly because of the need to fund both interventions and research). Finally, strong capacity building and leadership are needed for stimulating political engagement, producing or identifying relevant research, understanding and coordinating the various stakeholders while considering their drivers, barriers and needs.

Researchers advocate that setting a national nutritional research and policy agenda can improve awareness of the needs and benefits of specific nutrition issues that are insufficiently addressed and stimulate financial support or appropriate budget allocation. In addition, co-production of research projects between researchers and policymakers through priority-setting exercises (guided by appropriate tools) for considering

the various factors influencing political engagement and funding allocation can help bridge the gap and ensure an inclusive multi-sectoral and multidisciplinary perspective. Overall, building capacity is necessary to navigate the intricate web of relationships that requires action tailored to each context-specific needs and provide clear policy recommendations to inform policies (which can be supported by knowledge brokers (KB)). Further adopting new adapted methods of evidence production and quality rating procedures of nutrition evidence and recommendations, as well as promoting replication of studies, meta-methods and including insights of various stakeholders should enhance the quality, transparency and trustworthiness of nutrition evidence to garner political will. In addition, researchers should investigate new ways to synthesise evidence and dissemination platforms should be further developed and implemented to improve accessibility to quality evidence and reduce research waste. Finally, M&E of impact should be promoted among funders and decision makers and funders should be engaged early in the co-production of research projects (e.g. within priority-setting exercises) to improve awareness and understanding of research evidence needs.

The successful implementation of EIDM is a complex and iterative process that requires flexibility and careful attention to the various actors' interests. The management of this intricate web of relationships calls for strong leadership and ongoing communication between researchers and policymakers.

1. Introduction

Improving nutritional status is one of the most important development / global health challenges of our time. According to the 2018 Global Nutrition Report, progress in addressing malnutrition is still insufficient, with an estimated 150.8 million children stunted, 50.5 million wasted, 38.3 million overweight and 2.01 billion adults overweight or obese (GNR, 2018). The combination of undernutrition, micronutrient deficiencies and obesity/overweight, referred to as the "triple burden", has multigenerational health and economic impacts and affects predominantly low- and middle-income countries' (LMICs) populations. Addressing this issue is essential for facing the global development challenges and achieving the Sustainable Development Goals (SDG), especially SDG2 "End hunger/Improve nutrition" and SDG3 "Health/Wellbeing"[1], while nutrition is also recognised as being at the heart of several other SDGs [2].

Malnutrition needs to be addressed by tackling its immediate and underlying determinants through a combination of nutrition-specific interventions (e.g. exclusive breastfeeding programmes) and nutrition-sensitive interventions (e.g. cash transfer programmes). It is strongly recommended that these interventions be accompanied by enabling environment policies, laws and regulations (Bhutta et al., 2013; Holdsworth et al., 2014). To achieve this, there is a need for multi-sectoral, multi-partner and interdisciplinary collaboration, increased political commitment and adequate funding.

Evidence-informed decision-making (EIDM) has been outlined as enabling better action for sustainably facing malnutrition, therefore it has gained increasing interest and presence within the food security and nutrition research agora (e.g. Aryeetey et al., 2017; Holdsworth et al., 2016; Lamstein et al., 2016; WHO/UNICEF, 2020). Implementing EIDM is not as straightforward as it sounds. Various barriers and challenges in proceeding with EIDM have been pointed out by the scientific community, such as economic constraints and insufficient intervention-related evidence needed for policy development (Aryeetey et al., 2017b; Gillespie et al., 2016, 2013; Holdsworth et al., 2016, 2014; Irwin et al., 2018; Laar et al., 2015; Lachat et al., 2015; Morris et al., 2008; Motani et al., 2019; Pradeilles et al., 2019; Resnick et al., 2015; Shroff et al., 2015; Van Royen et al., 2013). Particularly in LMICs contexts, where resources are scarce and needs are plenty, many authors suggest that there is a strong need for accelerated efforts on improving and stimulating the use of EIDM, through building enabling environments (Bhutta et al., 2013; Bowen et al., 2009; Holdsworth et al., 2014; Innvaer et al., 2002; Lachat et al., 2014; Motani et al., 2019; Orton et al., 2011), improving capacity and leadership (Aryeetey et al., 2017b; Gillespie et al., 2013, 2016; Holdsworth et al., 2016; Motani et al., 2019; Shroff et al., 2015; Williams et al., 2010), for addressing the urgency of malnutrition with actions that make the best use of the available resources (Holdsworth et al., 2016, 2014; Ioannidis et al., 2014; Lachat et al., 2015; Lamstein et al., 2016; Strassheim, 2015; WHO/UNICEF, 2020).

2. Objectives and Scope

The objective of the present review was two-fold: i. to provide an overview of the current existing scientific literature on the concept of "evidence-informed decision-making" (EIDM) for nutrition policy through an understanding of what is meant by "evidence" in nutrition science (in contrast with public health or medical "evidence"), and ii. to explore the epistemology of EIDM in relation to its use in public policies related to nutrition and the challenges and facilitators in its use.

[1] See at: https://sdgs.un.org/goals

[2] See at: https://scalingupnutrition.org/nutrition/nutrition-and-the-sustainable-development-goals/nutrition-at-the-heart-of-the-sdgs_001/

This review will contribute to the Nutrition Research Facility's (NRF) missions by providing a better understanding of the accumulated knowledge on the nutrition-EIDM concept, its identified challenges and facilitators, for reflecting on new strategies and innovative methods to support the implementation of EIDM for nutrition public policies.

3. Methods

A narrative literature review was carried out in two databases, "Google Scholar" and "PubMed", without geographical limitations and using an iterative and non-exhaustive process, in order to identify the key terminologies and theoretical frameworks used. This type of review enables an overview of recent methods on the subject of inquiry to be examined, while covering a wide range of aspects at various levels of *exhaustivity* through conceptual, chronological and thematic analysis. A full systematic qualitative evidence synthesis review was not appropriate as it is typically used to include or exclude concepts or themes to study a specific research question (Booth et al., 2016). Whereas in this review, we aimed for a non-exhaustive overall discussion on the diversity of knowledge existing on the EIDM topic.

The search was conducted using the following keywords: "evidence in nutrition"; "evidence-based decision-making nutrition"; "evidence-informed decision-making nutrition"; "evidence-based policymaking"; "evidence-informed policymaking nutrition"; "evidence-based nutrition"; "epistemology of evidence-informed decision-making nutrition"; "evidence-informed decision-making nutrition challenges"; research-driven nutrition policy" and through reference list follow-up. Key references were also identified in reference lists of included papers and shared by the review team members. Many concepts and tools identified in the present review have been developed in the health sector and are reflected upon their application to the nutrition sector.

4. Literature review findings

4.1. How did the academic and political interest in EBDM and EIDM rise and what is the difference between the two concepts?

According to Strassheim (2015), in his analysis of the epistemology of policy expertise, the approach of evidence use in policy making is a continuation of the 1960s "policy analysis movement" that aimed to minimise political failure, whilst maximising "policy analytical capacity" through systematic evaluation methods and scientific expertise. In this dynamic, the *leitmotif* of EBDM and EIDM approaches enable more rational and reliable problem-solving processes through the use of scientific evidence in policy development. This follows the perspective of "*objective epistemologies*", which draw a clear boundary between science and policy or knowledge and value, in opposition to "*political epistemology*" perspectives that considers a mutual constitution between science and policy (Strassheim, 2015), rather than an axiological neutrality by researchers, i.e. conduct research with recognition that researchers face personal bias that needs to be identified and be detached as much as possible when conducting research and interpreting its results (Weber, 1917).

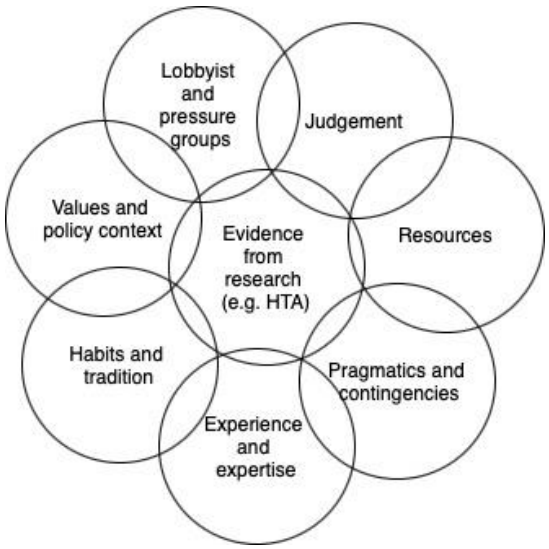
The terms EBDM and EIDM consider a different spectrum of influencing factors and sources of knowledge depending on the definition of "evidence" (cf. section 4.3. "What is meant by evidence in the field of health and nutrition?"). According to the conceptualisation of EBDM/EIDM by Satterfield et al (2009) and adapted by Holdsworth et al (2016), their framework differs in the criteria considered for the design, implementation and assessment of decision-making. In this framework, EBDM only takes account of scientific evidence. Whereas the EIDM framework explicitly considers the scientific evidence within the organisational and environmental context in which the decision-making will occur. This includes the accessibility to financial

resources and understanding how much of it is available, the specificities of target communities (i.e. cultural norms), the political environment that carries expectations, norms, values and preferences, and the advocacy environment (i.e. non-governmental organisations' (NGOs) lobbying) within the considered decision-making arena. According to this framework, all of the latter can potentially condition the acceptability, compliance and efficiency of decision-making among different stakeholders, while requiring important multi-sectoral collaboration, leadership, capacity, political commitment and funding (Aryeetey et al., 2017; Holdsworth et al., 2016; Lamstein et al., 2016; WHO/UNICEF, 2020).

This EIDM framework reflects the health-related policymaking framework conceptualised by Davies (2005) and adapted by the World Health Organisation (WHO) Regional Office for Europe et al. (2008)**.** Davies' framework considers health-related policies as based on scientific findings (e.g. evidence-based input that relies on national Health Technology Assessment (HTA) agencies evaluation procedures), while being influenced by factors such as personal judgment of the policymaking stakeholders, pragmatism and contingence, or lobbyist and group pressure (cf. Figure 2) (WHO et al., 2008).

In other words, the EIDM framework (Holdsworth et al., 2016; Satterfield et al., 2009) and Davies's (2005) framework explicitly recognise that decision-making depends on factors that go beyond scientific or academic evidence, but is influenced by other drivers, such as stakeholders' interests, power struggles or lived experiences of the target communities (Holdsworth et al., 2016; Satterfield et al., 2009). In contrast, EBDM's framework suggests a separation between academic scientific evidence with all other factors that compound the policymaking environment. EIDM's explicit representation of decision-making is in line with recommendations that nutrition interventions be accompanied by supportive enabling environments, for consideration of direct and indirect drivers that influence nutrition outcomes (Bhutta et al., 2013; Holdsworth et al., 2014).

Figure 2. Influence factors of the policymaking framework



Source: WHO et al. (2008), adapted from Davies (2005)

4.2. The evolution of the scope of the nutrition field in response to emerging nutrition issues

The recognition of a plurality of factors in the EIDM framework, as part of the policy-making process, resonates with the observed evolution of the scope of the nutrition field. With its links to food and policy, nutrition has evolved to go beyond its original biochemical, physiological and medical framing ("nutrition-specific" determinants) to include factors such as poverty alleviation and women's empowerment ("nutrition-sensitive" determinants) (Cannon and Leitzmann, 2005; Kimura, 2013; Mente et al., 2009;

Mozaffarian et al., 2018; Nisbett et al., 2014; Penders et al., 2017; Scrinis, 2016, 2015, 2013, 2008; Woodside et al., 2005).

From the beginning of the 20th century until the beginning of the 21st century, nutrition science was mainly nutrient-focused (Cannon and Leitzmann, 2005; Mozaffarian et al., 2018). The isolation of the first vitamin (thiamine or vitamin B_1) occurred in 1926, leading to what was known as "modern nutrition science". These events happened at the same period as the Great Depression and the Second World War; times where food shortages accelerated the need, e.g. beriberi disease caused by thiamine deficiency (Mozaffarian et al., 2018). The research focus remained mainly on single nutrients and the dominant debate among the nutrition research community revolved around which "charismatic nutrient" needed to be promoted and made accessible, and which one could cause harm to health (Kimura, 2013; Mozaffarian et al., 2018; Scrinis, 2016, 2015, 2013, 2008). A parallel debate emerged on the need to consider underlying determinants of malnutrition, especially to improve accessibility to food through reducing poverty (Carpenter, 1994; Mozaffarian et al., 2018). This climate of debate and uncertainty led to an environment that fostered multinational industry promotion of fortified food products (i.e. enriched in vitamin A) (Mozaffarian et al., 2018). Until the 1990s (also known as the "micronutrient era" (Nisbett et al., 2014)), in high-income countries (HIC) and LMICs, both scientific inquiry and policy interventions remained nutrient-focused (Cannon and Leitzmann, 2005; Kimura, 2013; Mozaffarian et al., 2018; Nisbett et al., 2014; Scrinis, 2013, 2008).

In the 2000s, research on nutrition-related non-communicable diseases (NCDs) accelerated (Cannon and Leitzmann, 2005; Mozaffarian et al., 2018), combined with the development of new study designs (i.e. prospective observational studies or randomised controlled trials (RCT)) and completion of multiple large nutrition studies. According to the authors, these evolutions brought discordance among the results (especially between cohort studies and supplement trials of specific vitamins on specific diseases) leading to many controversies within the nutrition scientific community (Mente et al., 2009; Mozaffarian et al., 2018; Woodside et al., 2005). Nutrient-focused research and interventions were still highly promoted, for example, during the Copenhagen Consensus in 2008, which promoted fortification as the most cost-effective and sustainable approach to address micronutrient deficiencies (Kimura, 2013; Nisbett et al., 2014).

In the same period, an increased focus on the "double burden" of malnutrition (coexistence of undernutrition which includes micronutrient deficiencies, with obesity/overweight and diet-related NCDs) arose and was reflected upon with the same nutrient-focused logic in the main (Kimura, 2013; Nisbett et al., 2014). This approach, also known as "nutrition reductionism" or "nutritionism", is indispensable for shedding light on the effects of specific nutrients or ingredients on health. Nonetheless, its restrictive approach hampers the diversification of disciplines needed in nutritional sciences by focusing on biochemical substances and limiting the development of 'nutritional social sciences' (Penders et al., 2017). In addition, "nutrition reductionism" has been heavily criticised as serving the neoliberal interests of food companies, which built their "nutrient-focused" commercial branches with the rise of "modern nutrition science" (Mozaffarian et al., 2018), especially due to LMICs market-driven interventions for tackling micronutrient deficiencies (accessibility to fortified foods through existing commercial distribution channels). Critics advocate for better consideration of a broader scope of determinants when developing strategies to address malnutrition, hence "nutrition-sensitive" determinants need to be addressed, by engaging with the communities to gather their insights on the nutrition issues and by identifying best practice to solve them (Kimura, 2013; Mozaffarian et al., 2018; Scrinis, 2016, 2015, 2013, 2008; Street, 2015).

With the increasing attention given to underlying determinants of malnutrition, the widening scope of nutrition was further developed (Beaudry and Delisle, 2005; Cannon and Leitzmann, 2005). This "new nutrition", also sometimes referred to as "public nutrition", encompassed environmental, social, cultural and psychosocial dimensions, in order to consider all factors that contribute to the relationship between

individuals and food (Beaudry and Delisle, 2005; Cannon and Leitzmann, 2005). *Ergo*, the "public nutrition" framework includes both "nutrition-sensitive" and "nutrition-specific" determinants. Moreover, Beaudry and Delisle (2005) differentiate "public nutrition" from "public health nutrition", as the latter is considered too narrow in regard to the psychosocial and cultural aspects impacting on food behaviours and subsequent nutritional outcomes.

The authors summarised "public nutrition" as a "triple A" action: (1) the assessment of the problem that relies on nutritional epidemiology and biological knowledge; (2) the analysis of three categories of drivers: food systems and food security (e.g. the impact of the private food sector advertising on the food and nutritional landscape), the food and health practices at a community, family or individual level and its psychosocial and cultural determinants, and the health systems (e.g. the available resources and adequate training of health workers); and (3) identifying the necessary action to solve the nutritional problem, equitably and sustainably. The purpose of the triple A or "public nutrition" framework is to shift thinking towards a "right-based" approach, by ensuring equity in access to adequate and nutritious food (Beaudy et Delisle, 2005). Hence, aiming for sustainable long-term structural improvement of food security and nutritional status by addressing the causes of malnutrition, rather than treating its symptoms. This argument is consistent with critics against the "nutrition reductionism" approach (Carpenter, 1994; Kimura, 2013; Mozaffarian et al., 2018; Scrinis, 2016, 2016, 2015, 2013, 2008) and is supported by many stakeholders, especially within the research community (Holdsworth et al., 2014; Lachat et al., 2015). Subsequently, more comprehensive approaches such as the "double-duty actions" have emerged as strategies addressing both undernutrition and overweight/obesity or nutrition-related NCDs by developing interventions, programmes and policies aiming to improve factors such as urban food policies and systems (e.g. direct farm-consumer marketing) or social policies (e.g. paid maternity leave) (WHO, 2017). In addition, international initiatives such as Scaling Up Nutrition (SUN), which is active in 63 countries in the Global South[3] since it was launched in 2010 (Nisbett et al., 2014), aims to build greater understanding of the underlying determinants of malnutrition with a view to sharing this knowledge among the research and policymaking community and fostering multi-stakeholder concertation through a multi-sectoral approach.

In turn, the evolution of the scope of nutrition in addressing malnutrition and its two entry points ("nutrition-specific", addressing the immediate determinants of malnutrition, and "nutrition-sensitive", addressing the underlying determinants of malnutrition) highlights the need for research to be pluri-dimensional. The changes in the nutritional landscape and related challenges push research needs towards a broader approach and means that the necessary responses for improving nutrition globally need to shift focus from a clinical level to a food system level. Therefore, reflecting the wide framework of health-related policymaking (Davis, 2008; Holdsworth et al., 2016; Satterfield et al., 2009; WHO et al., 2008; WHO, 2017) and the importance of EIDM's use in nutrition public policies.

In public health and with the shift of focus from the "individual-clinical" level to the "population-policy" level, the policy process has gained in complexity and uncertainty. This called for better justification of problem-solving policies on scientific grounds in HIC, and the quest has gained increasing attention in LMICs (Dobrow et al., 2004). According to the IFPRI 2016 nutrition report for Africa, "(…) *countries are likely to make faster progress if they prioritise nutrition in their policies, plugging the knowledge gaps and championing nutrition helps them make informed policies and plans for addressing malnutrition. Evidence-based nutrition policies and research programs, when rolled out on a national scale, have the potential to deliver improved nutrition at the population level and contribute to sustainable development outcomes.*"(IFPRI, 2016). The demand for justifying policy action through evidence use is still much needed in LMIC settings, due to calls for prioritising research for effective nutrition interventions to maximise public health benefits and resources through cost-

[3] See at: https://scalingupnutrition.org/

effective and efficient interventions (Holdsworth et al., 2016, 2014; Ioannidis et al., 2014; Lamstein et al., 2016; Motani et al., 2019; WHO/UNICEF, 2020).

4.3. What is meant by evidence in the field of health and nutrition?

"Evidence" is defined by the Oxford English Dictionary as "*the available body of facts or information indicating whether a belief or proposition is true or valid*"[4] and suggests that an unequivocal understanding of such based on proof and rationality (Rycroft-Malone et al., 2004). In addition, another definition for evidence proposed by Higgs and Jones (2000) describe evidence as "*knowledge derived from a variety of sources that has been subjected to testing and has found to be credible"* (2000). With regards to health, Lomas et al.'s (2005) further developed the definition of "evidence" as "*findings from research and other knowledge that may serve as a useful basis for decision-making in public health and health care"* which was adopted by the Health Evidence Network (EVIDENT). This third definition explicitly includes contextual factors that influence decision-making, such as accumulated knowledge on a context's health challenges and existing practices, public health resources or the political climate (Holdsworth et al., 2017); but it does not emphasise the quality appraisal of evidence that is underlined by Higgs and Jones' (2000) definition or implied in the unequivocal dimension of the Oxford English Dictionary's definition. This quality rating procedure is required in evidence-based nutrition (EBN) and evidence-based medicine (EBM), as reflecting their definition of disease treatment and prevention practices based on recommendations identified from rigorous findings that have been through a quality rating procedure (Johnston et al., 2019; Mann, 2010). But other conceptual frameworks of evidence-based clinical decisions have included clinical expertise, research evidence, patient preferences (Rycroft-Malone et al., 2004; Satterfield et al., 2009) and local context and environment (Rycroft-Malone et al., 2004).

Lomas et al.'s (2005) definition appears to tend towards a holistic comprehension of the factors that influence decision-making, through the inclusion of insights from a wide range of stakeholders to identify the limits, barriers, facilitators and possibilities of nutrition interventions for developing further policy actions and interventions to improve nutrition. Nonetheless, debates and controversies are ongoing within the health field, and even more in the nutrition fields, on what should be recognised as quality evidence. According to Rycroft-Malone et al. (2004) quantitative research evidence in health tends to be further valued and "*The prominence ascribed to research evidence has meant a relative neglect of other forms of evidence (…)"*. Lomas et al.'s (2005) definition includes qualitative evidence (such as lived experiences of the targeted communities) which is often subjective, hence, equivocal. This definition is consistent with the "public nutrition" definition previously proposed (Beaudry and Delisle, 2005; Cannon and Leitzmann, 2005) as requiring a broader scope of assessment, analysis and action, compared to the nutrient-based (or "nutrition-specific") scope. With its use, the EBDM and EIDM frameworks are similar. But the question relies on which type of "evidence" and the level and evaluation of its quality to be included in both frameworks for basing decision-making upon.

4.4. What is viewed as quality evidence in nutrition compared to medicine?

Different procedures and guidelines have been established for the quality appraisal of evidence for nutrition and medicine. A prominent example is the GRADE approach (Atkins et al., 2004) that was adopted by the WHO in 2007 for the development of public health guidelines (Guyatt et al., 2008) and by more than 110 organisations in 19 countries[5]. Quality assessment procedures, such as GRADE, involve using standardised methodologies for systematic literature reviews leading to a categorisation of the identified evidence into "high", "moderate", "low" and "very low" levels of quality (Guyatt et al., 2008; Johnston et al., 2019; Mann,

[4] See at : https://www.oed.com

[5] See at: https://www.gradeworkinggroup.org

2010), and recommendations into either "strong" or "weak" levels of quality (Guyatt et al., 2008; Mann, 2010). A strong recommendation is one where the evaluating panel is confident that desirable effects of adherence outweigh potential undesirable effects. A weak recommendation is when there is a lack of high-quality evidence to support the recommendation, imprecise estimation of risk and benefits or uncertainty regarding outcome variation between studied groups or individuals and where costs may outweigh benefits (Mann, 2010).

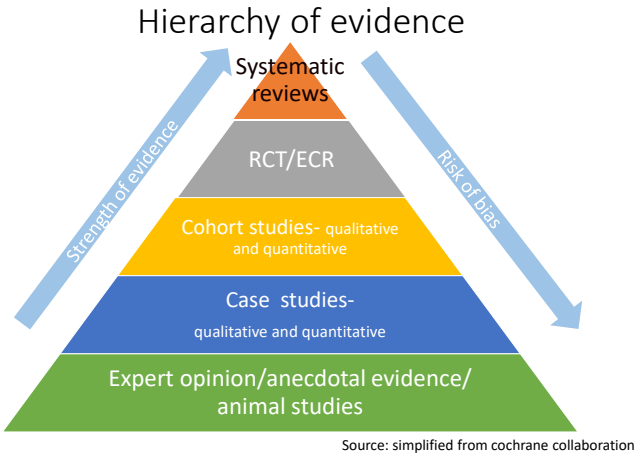
The harmonisation of the guidelines for evidence quality rating and strength of recommendations in health is promoted as a means to ensure better consistency, coherence and understanding of the messages provided by the scientific community (Guyatt et al., 2008). In health science, evidence considered as the most reliable emerge from meta-analysis and systematic reviews, followed by RCTs that is considered as a "gold standard" for clinical science, including by the GRADE guidelines (Guyatt et al., 2008; Johnston et al., 2019; Mann, 2010; Rycroft-Malone et al., 2004). In contrast, observational studies are often regarded as less reliant because they are more subject to bias (cf. Figure 3) (Guyatt et al., 2008; Johnston et al., 2019; Mann, 2010; WCRF/AICR, 2018). Due to the consideration for a higher risk of bias, the observational methodology is linked to important challenges of communication of scientific findings from the research community to the policy sphere and general public (cf. further developed in section 4.5.1. "Challenges linked to the relationship between the research community and the policy sphere").

But there is a debate among the nutritional epidemiologists in regard to the eventual limitations of RCT use to investigate the effects of diet and nutrition on health outcomes. Firstly, some argue that the difficulties of isolating the effect of a single nutrient and the complicated identification of effect of interacting components may present a bias to the study. For example, if a trial aims to evaluate the effect of a nutrient's low intake within a diet, there is a probability that the reduced nutrient will be physiologically substituted in the subject's body by another nutrient present in the food pattern, or that observed health outcomes during the trial may be due to other health-related behaviours (e.g. physical activity or tobacco use) (Johnston et al., 2019; Mann, 2010; WCRF/AICR, 2018). Supplement intake is less at risk of bias, but it is difficult to draw the same conclusions on the consumption effects of a nutrient's extracted form and that of nutrients consumed within a "normal" diet (Johnston et al., 2019). In addition, human nutrition RCTs can lead to high dropout rates due to the lengthy follow-up period, or the changes in dietary habits demanded from the participants (e.g. modifying their dietary habits on a daily basis and for several months) (Johnston et al., 2019; Satija et al., 2015; WRCF/AICR, 2018). Moreover, the relationship between NCDs and nutrition can be difficult to identify because the effects of the nutritional risk factors might occur decades later. Hence, human nutrition RCTs often have a high cost and the dietary intervention's effects can be difficult to assess (Mann, 2010). In comparison, some authors argue that human nutrition observational studies have been shown to result in lower dropout rates, but there is a higher risk of bias (Atkins et al., 2004; Johnston et al., 2019), i.e. such as the memory bias when the study relies on diet self-reporting surveys, leading to more difficulties in extrapolating the findings into nutrition recommendations and policies.

In turn, and due to the high reliance on RCTs, approaches such as GRADE are more likely to categorise nutrition evidence as of "low" or "moderate" quality when generated through observational studies and can lead to a misguided interpretation of nutrition recommendations. Additionally, decision makers, the media or the general population are less likely to adhere to recommendations based on evidence reported as of "low" or "moderate" quality (Mann, 2010). An RCT is a good quality study design that can be applied to clinical interventions as well as more complex ones (such as at community or regional level) and has frequently proven its effectiveness and efficiency, including during EIDM monitoring and evaluation (M&E) of impact phases (cf. Box 3: Example of a successful EIDM implementation: the « Prospera Program of Social Inclusion » conditional cash transfer programme in Mexico). But in order to improve the quality of nutrition science, it is advocated that the field further adopts other types of studies that are more flexible (i.e. quasi-

experimental) (Johnston et al., 2019; Mann, 2010; Penders et al., 2017) or address the RCTs methodological challenges with process evaluation procedures in RCTs of complex interventions (Oakley et al., 2006).

Figure 3. Hierarchy of evidence in relation to strength of evidence



To address this issue of the adequacy of nutrition evidence quality rating and subsequent reliability (or trustworthiness), some initiatives have emerged to provide new systematic grading systems to improve nutrition evidence evaluation. The World Cancer Research Fund (WCRF) proposed a new standardised framework, initially conceptualised for studies investigating cancers linked to diet, nutrition and physical activity, but it also fits other diseases (Mann, 2010). The WCRF framework does not rely on RCTs as a gold standard and has modified the quality rating terminologies of evidence into "strong" (subdivided into "convincing" or "probable") exposure causality or "limited" (subdivided into "suggestive" or "no conclusion") (the Third Expert Report: WCRF/AICR, 2018) which enables being able to base a recommendation on a piece of evidence evaluated as "strong". Hence, this grading system allows justifying recommendations with evidence emerging from methodologies better adjusted to nutrition research inherent requirements (Mann, 2010; WCRF/AICR, 2018). The First Expert Report of the WCRF approach (WCRF/AICR, 1997) (similar to the Third and Second (WCRF/AICR, 2007)) was used by the Food and Agriculture Organization (FAO)/WHO technical report on nutritional recommendations for chronic diseases (WHO/FAO, 2003). Later on, NutriGrade, an adaptation of GRADE for nutrition research emerged to evaluate the quality of RCT studies and cohort study meta-analysis and takes into account nutrition research specific requirements (Schwingshackl et al., 2016). Therefore, this framework still relies, in the main, on RCT studies as a 'gold standard' but modifies the systematic grading system for better adequacy.

Enhancing the quality of the reporting of nutrition research is also key to improving the trustworthiness of nutrition evidence (personal communication – Lachat, 2021). Guidelines in the form of checklists for various study types (e.g. qualitative research, case reports) were developed by the EQUATOR Network[6] and include the STROBE checklist for reporting observational studies. An adaptation, the STROBE-nut checklist initiative, was introduced to improve the reporting of epidemiological nutrition reporting within observational studies (Lachat et al., 2016), thus enabling the reliability of this study type to be enhanced when researchers complied with the checklist.

Within the nutrition field, both NutriGrade (Schwingshackl et al., 2016) and STROBE-nut (Lachat et al., 2016) are poorly used and adopted (source, personal communication - Lachat 2021), although both are promising

[6] See at: https://www.equator-network.org

tools to improving the quality of nutrition research and reliance of produced evidence, and subsequently for facilitating their use for supporting EIDM.

4.5. Challenges and facilitators identified in implementing and using EIDM

EIDM in public health and public nutrition faces many challenges, both in HIC and LMICs. These challenges are linked to several factors, such as the political will in using evidence to support decision-making (Van Royen et al., 2013), structural capacities in accessing and using relevant evidence when they are available (Aryeetey et al., 2017b; Gillespie et al., 2016; Holdsworth et al., 2016; Motani et al., 2019; Shroff et al., 2015; Williams et al., 2010), lack of leadership (Gillespie et al., 2016; Holdsworth et al., 2016; Resnick et al., 2015) and issues related to funding of research or policy development that reflects subnational, national and community nutritional priorities (Holdsworth et al., 2014; Lachat et al., 2015).

4.5.1. Challenges and facilitators linked to the relationship between the research community and the policy sphere

4.5.1.1. Challenges linked to the relationship between the research community and the policy sphere

Several issues related to the relationship between researchers and decision makers are barriers to EIDM implementation. To begin with, there is a lack of interaction linked to poor infrastructure that reduces the opportunity of mutual engagement, thereby impacting on its quality. In addition, the high turnover of elected political staff can complicate and be detrimental to the relationship building among both actors. It has also been reported that there is a mutual mistrust due to a lack of understanding of the political economy and perceived political naivety by researchers, or conversely, a research naivety by decision makers (Bowen et al., 2009; Innvaer et al., 2002; Motani et al., 2019; Orton et al., 2011). In the cognitive analysis of public policies, this misunderstanding is explained, at least in part, by the different representations, rules and norms (or "referential") of both communities (each community defines its referential within its "forum", which is then confronted with other communities' referential within an "arena"). Consequently, both communities' referential can translates into different goals and difficulties may occur in terms of understanding their benefits and needs when expressed in the arena (Fouilleux, 2000).

Communication and mistrust issues between policymakers and researchers can also be reinforced by the general phenomenon of increased doubts in the credibility of scientific findings that impacts more severely on the nutrition sciences due to the daily interactions of individuals with food (Brown et al., 2014; Fischler, 1990; Penders et al., 2017). This mistrust can be linked to well-anchored food and nutritional beliefs of individuals based on myths, intuitions or anecdotes, thus preconceptions that are not grounded on empirical evidence (Brown et al., 2014; Fischler, 1990). Researchers may also be biased by their beliefs (e.g. political views or confirmation biases), which can impair the interpretation of their findings and damage public trust (Brown et al., 2014).

Moreover, mistrust in scientific evidence can be caused by inefficient communication of scientific findings outside of the research community (Johnston et al., 2019; Penders et al., 2017), as research institutes sometimes aim to share high impact and overly simplified messages to attract media attention while the public often seek oversimplified nutrition statements on what is healthy or not (Penders et al., 2017). Consequently, the media can be an additional confounding factor, as it may diffuse unfiltered and sometimes distorted or contradictory findings (Brown et al., 2014; Johnston et al., 2019) and the discussion is further confused by the presence of "self-appointed experts" in the nutrition communication agora (of which the recommendations may not reflect quality evidence) (Penders et al., 2017). Moreover, doubts on potential conflicts of interests, most often linked to public-private partnerships in funding of research and ties with industrial actors, can lead to questioning of the reliability of the results and adds to the phenomenon of distrust of scientific findings (Brown et al., 2014; Penders et al., 2017). All of this contributes to the general confusion about nutritional best practices, through to several debates that accompanied the evolution of

modern nutrition science (Cannon and Leitzmann, 2005; Kimura, 2013; Mozaffarian et al., 2018; Nisbett et al., 2014; Scrinis, 2016, 2015, 2013, 2008); thereby leading to an impaired perception of the trustworthiness of the evidence produced by the various EIDM stakeholders in nutrition (Bowen et al., 2009; Innvaer et al., 2002; Motani et al., 2019; Orton et al., 2011).

4.5.1.2. Facilitators linked to the relationship between the research community and the policy sphere

Facilitators for fostering this dialogue between the diversity of stakeholders include further establishing or improving existing coordinating bodies at government level to facilitate engagement between the research community and policy sphere. Such coordinating bodies exist, but have not always been effective (e.g. in Mozambique, Nigeria and Uganda) (Benson, 2008; Van Royen et al., 2013). The SUN movement fosters multi-stakeholder (i.e. CSOs, funders, researchers, UN agencies and governments) consultation platforms[7] that are a promising infrastructure for improving the dialogue, and its results vary according to the context (cf. Box 1: SUN concertation platforms).

The consideration of the political economy is key in the arena dialogue, as it is a crucial driver of the political action (Gillespie et al., 2016, 2013; Nisbett et al., 2014). According to Nisbett et al. (2014), "*(…) the political economy of different stakeholders, ideas, and interests which both shape the narratives and available knowledge and enable and constrain the processes by which this knowledge is turned into action (…)*". *Ergo*, nutrition research priority-setting that is adapted to the policy sphere representations, norms and values (Fouilleux, 2000), it is essential that the nutrition research process for EIDM includes political science and sociology researchers (Gillespie et al., 2016, 2013; Nisbett et al., 2014). As well as engaging with the diversity of stakeholders (i.e. funders, CSOs) to capture the drivers of the organizational and environmental context in which the EIDM is taking place and that has an influence on the political process (Davies, 2005; Holdsworth et al., 2016; Satterfield et al., 2009).

For improving trust in, and overall quality of nutrition research and evidence, some authors stress that replication initiatives and meta-methods can improve the generalisability of results and help determine issues with regard to a specific research question's study design or spaces for improvements in the nutrition research field. Inclusion of more flexible study types such as observational studies, as they provide important information that may not emerge from RCTs (which can be improved through process evaluation in RCTs of complex interventions (Oakley et al., 2006)) but can be of high relevance, especially for nutrition-sensitive research and policies (Ruel et al., 2018). In addition, academic articles should clearly state their initial purpose to improve the interpretation of their results through the registration of the study, as this enables faithful reporting of the primary endpoints (Brown et al., 2014). This emphasises the need to further adopt approaches such as the STROBE-nut initiative (Lachat et al., 2016) for improving reporting of epidemiological nutrition and overall adherence to research models' guidelines, such as the ones aggregated by the EQUATOR network[8] can help to better communicate research within the research community, improve replication initiatives and reliance of evidence (Brown et al., 2014). For quality rating of nutrition evidence and recommendations, the previously mentioned initiatives such as NutriGrade (Schwingshackl et al., 2016) (cf. section 4.4. What is viewed as a quality evidence in nutrition compared to medicine) should also be further adopted and used among the scientific community (personal communication – Lachat, 2021). Within the research community, more encouragement and support must be directed towards research that is rigorously conducted, as well as a better consideration of the potential personal biases that can influence the interpretation of results (Brown et al., 2014).

[7] See at: https://scalingupnutrition.org/

[8] See at: https://www.equator-network.org

Moreover, some authors recommend that the need for inclusivity be emphasised in nutrition research through inviting various nutrition stakeholders to the discussion table to identify research needs and solutions (Penders et al., 2017). Furthermore, improving inclusivity should improve the translation of findings and be a driver to increased general public trust in scientific outcomes, and subsequently the reliance by decision makers and their support services. Overall, engaging in multi-sectoral approaches (e.g. inclusion of non-academic contributors such as targeted communities) is recognised as a necessity by many authors for addressing malnutrition globally (Holdsworth et al., 2014; Kimura, 2013; Mozaffarian et al., 2018; Pradeilles et al., 2019; Van Royen et al., 2013; Scrinis, 2016, 2015, 2013, 2008).

The SUN movement answers this need of inclusivity through its platforms (cf. Box 1: The SUN concertation platforms) and aims to institutionalise ties between the various stakeholders and develop a culture of EIDM[9]. In addition, a variety of inclusive nutrition research priority-setting exercises have been elaborated and taken place, reuniting multisectoral and multidisciplinary stakeholders, particularly in HIC settings (Hawwash et al., 2018). Hawwash et al. (2018) proposed a guidance tool to enhance transparency in consideration of the stakeholders' values within the priority-setting process and based on prior nutrition research priority-setting exercises (cf. Box 2: Example of a tool to provide guidance for transparency in nutrition research priority-setting with consideration of the stakeholder's values)**.** These types of tools and methods are promising pathways to enabling successful EIDM, as they can lead to delivering policy recommendations that integrate research evidence, social values (Orton et al., 2011) and are based on a deep understanding of the decision makers' and other stakeholders' needs through "bottom-up" exercises to produce evidence that is applicable, relevant and generalisable for decision makers (Dobrow et al., 2004; Motani et al., 2019).

Nonetheless, it has been reported that the research questions emerging from the research prioritisation exercises are rarely acted upon, but rather serve as background information on a nutrition topic. An early engagement of funders and guided discussion between the stakeholders for these types of exercises is advised in order to increase earmarking of funding and calls for research on the prioritised research, thereby enhancing the quality of research and reducing research waste (Hawwash et al., 2021).

Once evidence is available, reinforcing infrastructure to disseminate and render it usable is crucial for enabling EIDM and organising effective interventions (Holdsworth et al., 2016; Lachat et al., 2014; Tenopir et al., 2011). This underlines the importance of project research and initiatives that work in palliating the issues linked to accessibility to data. Two examples are the Sustainable Nutrition Research for Africa in the Years to Come (SUNRAY) calls for *"(…) culture of data stewardship and long-term commitment needs to be fostered in the nutrition research community".* (Lachat et al., 2014) and the ongoing National Information Platforms for Nutrition (NIPN)[10] initiative that aims to increase access to data for nutrition-sensitive and nutrition-specific programmes for EIDM in Africa[11] (Holdsworth et al., 2016). In addition, several international organisations have made commitments to render data less isolated and more accessible, for example the CGIAR[12] and the WHO/FAO's Global Individual Food consumption data tool (GIFT)[13]. Recent data sharing platforms, such as Dataverse[14], also help overcome issues of accessibility and dissemination of evidence with an open data sharing driven from research funding agencies. Nonetheless, the concerns about difficulties in identifying and sharing evidence (Aryeetey et al., 2017b; Gillespie et al., 2016; Holdsworth et

[9] See at: https://scalingupnutrition.org/

[10] See at : http://www.nipn-nutrition-platforms.org/

[11] See at : http://www.nipn-nutrition-platforms.org/

[12] See at : http://www.cgiar.org/

[13] See at : http://www.fao.org/gift-individual-food-consumption/en/

[14] See at: https://dataverse.org/

al., 2016; Motani et al., 2019; Shroff et al., 2015; Williams et al., 2010) suggest a need to further develop, diffuse and use these data sharing sources among the policy sphere and research community.

The several initiatives (e.g. SUN and SUNRAY) aiming to improve the dialogue between EIDM stakeholders for addressing awareness on malnutrition issues and address its evidence gaps underlines the increasing global effort for engaging in nutrition-related EIDM. This reflects the growing attention global malnutrition has received with the United Nations Decade of Malnutrition (2016-2025) and that political commitment can be created and strengthened through strategic coordinated actions that includes context-related adaptations (Baker et al., 2018).

Box 1. The SUN concentration platforms

SUN is a global movement for collaborative processes that began as a framework in 2009. It aims to stimulate political interest and engagement among leaders of governments and development partners towards malnutrition. The movement is based on 10 principles (e.g. transparency, inclusivity, negotiations and cost efficiency). SUN hosts intergovernmental platforms and other fora including a diversity of stakeholders (i.e. CSOs, donors, researchers, UN agencies and governments) with 63 partner countries in the Global South.

The concertation process follows 4 main steps with 5 progress markers within each step [1]:

1. **Reunite the different stakeholders in a common action space** (progress markers: 1.1. Choose or develop national level coordination mechanisms; 1.2. Internal coordination and stimulate the participation of other actors for higher impact; 1.3. Contribute and engage in the multi-stakeholder platform; 1.4. Follow, report and have a critical reflection on the participants' own contribution; 1.5. Maintain the political impact of the multi-stakeholder platform).
2. **Ensuring a coherent policy and legal framework** (progress markers: 2.1. Continuously analyse nutrition laws and policies; 2.2. Continuously engage in advocacy to influence the development, adjustment and diffusion of relevant legal and policy frameworks; 2.3. Elaborate or adjust policy and legal frameworks for coherence and through coordinated and harmonised efforts from national stakeholders; 2.4. Render operational and enforce legal frameworks; 2.5. Monitor and report to improve learning and impact of policies and legislation).
3. **Aligning actions around common results** (progress markers: 3.1. Continuously analyse existing nutrition-relevant policies and legislation; 3.2. Translate policy and legal frameworks into actionable common results ones for reinforcing nutrition at national and local levels; 3.3. Organise and implement annual priorities in concordance with the common results framework; 3.4. Ensure monitoring of the priority action in concordance with the common results framework; 3.5. Evaluate the implementation of the actions to understand, achieve and maintain their effects on nutrition).
4. **Financial tracking and resource mobilisation** (progress markers: 4.1. Evaluate the financial feasibility of the common results framework; 4.2. Ensure the monitoring of nutrition funding and provide reports; 4.3. Reinforce and align the resources to palliate the lack of funding; 4.4. Ensure the funding promises are delivered; 4.5. Ensure the predictability of the pluriannual funding to support the results of the implementations and their repercussions on nutrition).

Examples of SUN Joint-Assessment consultation platforms:

The SUN consultation for Benin reunited 32 stakeholders (with gender parity) from 6 sectors (government, CSO, funders, UN, private sector and academics/scientists). The platform enabled the participants to discuss the efforts undertaken for addressing malnutrition in the country and the results for the period of April 2018 to April 2019. The evaluation of the progress made through the intensification of the nutrition-sensitive and nutrition-specific interventions enabled the next priorities for the period of April 2019 to April 2020 to be identified [2].

The same year, the SUN consultation for Congo reunited 20 stakeholders (6 women and 14 men) from 5 sectors (government, CSO, UN, academics/scientists and "other" (not specified)). The report for this consultation indicates that the main progress was sharing collected data among the participants and ensuring its coherence [3].

[1] See at: https://scalingupnutrition.org/wp-content/uploads/2020/06/SUN-JA-Explanatory-Note-ENG-2020_lowres.pdf

[2] See at: https://scalingupnutrition.org/wp-content/uploads/2019/11/JA-Benin-2019.pdf

[3] See at: https://scalingupnutrition.org/wp-content/uploads/2021/02/JA-2020-Congo-French.pdf

Box 2. Example of a tool to provide guidance for transparency in a nutrition research priority-setting with consideration of the stakeholders' value

Hawwash et al. (2018) have developed a guidance tool for adequate consideration of values in nutrition research priority-setting exercises. A systematic mapping review of nutrition priority-setting exercises and summary of their main characteristics was conducted, followed by a qualitative content analysis of values (e.g. impact). These values were organised within a tool that was tested during a consultation round reuniting authors of the priority-setting exercises selected in the systematic mapping review.

After the consultation round and subsequent adaptation, the guidance tool was designed and is composed of 3 criteria or "values" (feasibility, impact and accountability) with additional sub-values for each value (e.g. feasibility: answerable, realistic, supported and to be determined). These sub-values are clarified within the tool (e.g. feasibility; answerable; the research hypothesis is both clear and has the potential to be answered). Each sub-value can be ranked (low, medium, high, not applicable) and a comment section is available for adding points of considerations or decisions.

Although this tool still requires further testing to ensure its understanding and applicability, especially for nutrition research priority setting in LMICs, as all but one study included in the mapping review occurred in HICs settings, it is a promising systematic pathway to improving nutrition priority-setting exercises for multidisciplinary and multi-sectoral consultations (Hawwash et al., 2018). Based on a prior research priority-setting exercise, similar tools can be further developed to include guidance for the consideration of multisectoral stakeholders (e.g. CSOs, funders) values in nutrition policy building and to enable the co-establishment of a national nutritional policy agenda with higher potential of engagement from decision makers and efficiency of interventions on the nutrition outcome of populations.

4.5.2. Challenges and facilitators linked to the different timeframe requirements of researchers and decision makers

4.5.2.1. Challenges linked to the different timeframe requirements of researchers and decision makers

The different rules and norms of research and political fora (Fouilleux, 2000) tends to translate into different pace and timing requirements among the decision making and research community. Research projects often take three to six years to complete before beginning the dissemination and publication of results. In contrast, the policy process rhythm is much more rapid and elected policy officials often turnover every two to six years and juggle with numerous policy issues within one mandate. Therefore, by the time evidence is available to support policy changes, its relevance to the context may have diminished and the political or social environment may not be receptive to the research's targeted issues. In other words, policies often need to be enacted and implemented in a short timeframe, whereas producing quality evidence is time consuming and a longer-term process (Brownson et al., 2006).

This pace difference can contribute to the perceived naivety or the misunderstanding and difficult collaboration between researchers and decision makers (cf. section 4.5.1. "Challenges and facilitators linked to the relationship between the research community and the policy sphere") (Bowen et al., 2009; Innvaer et al., 2002; Motani et al., 2019; Orton et al., 2011). Additionally, an overall limited understanding of the benefits of nutrition interventions by decision makers has been reported and hinders the progression of nutrition research and policies overall (Benson, 2008; Bryce et al., 2008; Van Royen et al., 2013) (although it is improving with growing interest and actions dedicated to addressing global malnutrition (Baker et al., 2018)). When effective attention is given to nutrition issues, the political environment tends to focus on emergency situations and short-term solutions (Van Royen et al., 2013). Although emergency responses with shorter-term problem solving is essential in acute malnutrition crises (Van Royen et al., 2013; WHO,2006; WHO/FAO, 2003; WHO/UNICEF, 2020), it is an insufficient strategy to improve the underlying causes of

malnutrition sustainably for ensuring long-term food and nutrition security of communities (Lachat et al., 2015; Ruel et al., 2018; Van Royen et al., 2013). In turn, this translates into a lack of interest in nutrition-sensitive research and a lack of political will towards nutrition-sensitive actions (Van Royen et al., 2013), leading to financial support overly allocated to nutrition-specific research and interventions or other priorities (Leroy et al., 2007; Van Royen et al., 2013). This has been reported in sub-Saharan Africa (SSA), where the focus often remains on palliating consequences of malnutrition rather than on structural improvements (Holdsworth et al., 2014; Lachat et al., 2015). Hence, this strategy contradicts the recommendations of several authors on developing a greater focus on long-term solutions to malnutrition (e.g. Benson, 2008; Bryce et al., 2008; Holdsworth et al., 2014; Kimura, 2013; Lachat et al., 2015; Mozaffarian et al., 2018; Ruel et al., 2018; Scrinis, 2016, 2016, 2013, 2008; Van Royen et al., 2013).

4.5.2.2. Facilitators linked to the different timeframe requirements of researchers and decision makers

Different timeframe requirements are difficult challenges to address, as they are rooted in structural and systemic factors that characterise the scientific and political fora (Fouilleux, 2000). To address the perceived benefits of engaging in nutrition-sensitive entry points, several researchers advocate for the design of a long-term proactive plan through a policy national nutrition agenda, which can take place through existing platforms. As mentioned previously, the co-establishment of such an agenda can take place through existing platforms (e.g. SUN consultation platforms) and be guided by priority-setting tools. This would ensure better communication and awareness of the country's nutrition priorities, focus on prevention rather than treatment of malnutrition and could stimulate better budget allocation and enhance funding earmarking (Hawwash et al., 2021; Van Royen et al., 2013).

As organisational and environmental contexts and drivers have an impact on the implementation of EIDM (Davies, 2005; Motani et al., 2019; Resnick et al., 2015; Satterfield et al., 2009), it is key to consider how decision makers operate within the "real-world" political system and political economy, for successfully motivating political adherence to a national nutritional agenda (Gillespie et al., 2016, 2013; Nisbett et al., 2014). An important factor linked to the political economy and timeframe needs of decision makers are the re-election drivers. This theory emerges from the "Public Choices" school of thought that applies economic principles to the political science analysis of decision makers' rational (Arrow, 1951; Buchanan, 1967). The theory states that elected decision makers can aim to undertake action that maximises their personal benefits. For example, decision makers may favour actions that are congruent with the preferences of the electorate's majority in order to maximise their chances of re-election. These preferences may be related to the population's norms and values, for example, but may also not be in accordance with nutrition priorities defined by researchers or co-defined with decision makers. Furthermore, decision makers may select evidence for supporting EIDM that has a short-term impact for observing positive effects within their mandate and reinforce their chances of re-election (Mansour, 2017). This could be part of the rationale for the political interest for shorter-term nutrition actions reported by Van Royen et al. (2013) and contributes to the relationship issues between researchers and decision makers (i.e. perceived naivety) (Bowen et al., 2009; Innvaer et al., 2002; Motani et al., 2019; Orton et al., 2011). Consequently, it reinforces the need for political science and sociology research into nutrition research, including within the conceptualisation of priority-setting exercises, to act at the root of evidence gap identification and production, for subsequently providing better targeted policy recommendations to stimulate political engagement (Gillespie et al., 2016, 2013; Nisbett et al., 2014).

4.5.3 Challenges and facilitators linked to economic constraints of nutrition research and interventions

4.5.3.1. Challenges linked to economic constraints of nutrition research and interventions

Particularly in LMICs, a lack of coherence between the importance of addressing the malnutrition burden and the investment allocated to the problem at all levels (i.e. international, regional, national) has been reported (Leroy et al., 2007). This incoherence has been pointed out in the African Regional Nutritional

Strategy for 2005–2015 report (African Union, 2005) and could be a consequence of the funding source of nutrition research and interventions coming mostly from bodies outside of SSA (such as private agri-food multinationals) (Holdsworth et al., 2014; Van Royen et al., 2013). Consequently, there are issues of under sourcing of essential research that meets decision makers' needs and that answers the specific nutritional context, as well as issues with appropriate budget allocation for taking action on evidence that has been produced. Additional budget allocation issues emanate from power struggles or competition over resources between different political sectors (Bowen et al., 2009; Innvaer et al., 2002; Laar et al., 2015; Motani et al., 2019; Orton et al., 2011), which is reinforced by vertical funding of sectors and limited integration or cooperation among government ministries (Gillespie et al., 2016, 2013; Holdsworth et al., 2016).

An essential research step that lacks allocated investment is the M&E of community-based nutrition interventions. M&E is rarely seen as a priority by funders because of the insufficiently existing capacity of researchers and the lack of interest from funders in investing in actions that still need capacity building (Holdsworth et al., 2014; Lachat et al., 2015) although it is critical for *"(…) insuring the continuity (…) and its eventual scale-up to national level, identifying implementation challenges & raise questions on the magnitude."* (Neufeld et al., 2019). For example, the success of an intervention promoting breastfeeding in Brazil was due in part to rigorous M&E of compliance with the intervention, despite the country being heavily targeted by aggressive marketing of infant formula (Potvin et al., 2005). Or the success of the "Prospera Program of Social Inclusion" conditional cash transfer programme in Mexico that used EIDM for targeting beneficiaries and was the principal social safety net of the Mexican government (cf. Box 3: Example of a successful EIDM implementation: the « Prospera Program of Social Inclusion » conditional cash transfer programme in Mexico). The cash transfer was conditioned upon compliance with education, nutrition and health services and was made efficient due to, in part, the evaluation of results for allowing subsequent improvement to the programme (Neufeld et al., 2019). M&E is an important component of the research and policymaking process (cf. Figure 3) for determining what works in interventions aiming to alleviate the burden of malnutrition, identify gaps for improvement (WHO et al., 2008) and optimise the use of available resources (Holdsworth et al., 2016, 2014; Ioannidis et al., 2014; Lachat et al., 2015; Lamstein et al., 2016; Strassheim, 2015; WHO/UNICEF, 2020).

Box 3: Example of a successful EIDM implementation: the « Prospera Program of Social Inclusion »

Box 3. Example of a successful EIDM implementation: the « Prospera Program of Social Inclusion » conditional cash transfer programme in Mexico

Mexico has a culture of EIDM in health policymaking, which was extended to social protection, food security and nutrition policymaking through the design and implementation of the « Prospera Program of Social Inclusion » (previously "Progressa" followed by "Oportunidades Human Development Program") conditional cash transfer programme which operated for almost 21 years from 1997 on (Neufeld et al., 2019). This programme is considered one of the « big wins » of health-related EIDM implementation and has become the social safety net of the Mexican government[1].

Based on evidence, the programme targeted the poorest populations and most at risk of malnutrition to increase their purchasing power for food. To access a cash transfer, the beneficiaries had to attend and comply with preventive health services (i.e. vaccination, antenatal care) and health education talks. For families with children, additional cash was provided with a condition of regular attendance at school, and the transfer amount was larger for girls than boys, based on the evidence that girls have a higher drop-out rate. In addition, micronutrient supplements were provided to pregnant and lactating women, as well as fortified foods for children 6-23 months and children with low weight-for-age between 2-5 years. The Secretary of Social Development was responsible for the multisectoral programme, and the latter was managed by the National Coordination of the Program (Neufeld et al., 2019). By the 2000s, Progresa covered about 2.6 million families (about one third of rural families or 10% of all families in Mexico) with a budget of 800 million USD (Gertler and Boyce, 2001).

Its efficiency relied, in the main, on the rigorous evaluation of impact and its benefit-cost ratio. Based on evaluation results, several components of the programme were modified over the years to adapt to changes in social, economic and political priorities. This evaluation was critical for securing the continuity of the programme across the evolving political landscape and stability of social protection policies (Neufeld et al., 2019).

The impact evaluation included a randomised effectiveness trial in rural areas evaluating primary outcomes such as the nutritional status of young children or education and health indicators. Analysis of the RCT household panel data (89,293 individuals from 14,488 households in 506 communities) found that the use of health services increased faster in Progresa villages compared with control villages. Among the Progresa beneficiaries, children aged 0-5 years had a 12% lower incidence of illness compared to the control group, an 18% reduction in anaemia prevalence and a 1-4% increase in height. Younger adults (18-50 years) were significantly healthier with 19% fewer days of difficulties with daily activities linked to illnesses and the ability to walk 7.5% more without getting tired compared to the control group. Adults over 50 years had 19% fewer days of difficulties with daily activities, 17% fewer days incapacitated, 22% fewer days in bed and 7% more days with the ability to walk without getting tired, compared to the control group (Gertler and Boyce, 2001).

[1] Podcast: EAGxVirtual 2020: Evidence-informed decision-making in global health and development (Ruth Levine and Caithlin Tulloche)

4.5.3.2. Facilitators linked to economic constraints of nutrition research and interventions

Political economy power struggles within the web of relationships (Gillespie et al., 2016, 2013; Nisbett et al., 2014) and competition over resources among ministries (Bowen et al., 2009; Innvaer et al., 2002; Laar et al., 2015; Motani et al., 2019; Orton et al., 2011) or vertical funding in governments (Holdsworth et al., 2016) are inevitable aspects of the policymaking environment. Two types of economic constraints to EIDM implementation, and linked to the political economy, are financial and commercial drivers.

Financial drivers may influence decision makers' action, as they have an influence on which policy and interventions are feasible. Decision makers may be willing to follow nutritional recommendations of researchers but be limited by the priorities set by outside funding bodies (as they contribute to setting national nutrition priorities (Holdsworth et al., 2014; Van Royen et al., 2013)). Therefore, researchers need to consider advocating towards funding actors to stimulate their interest, as much as they need to do so towards decision makers, including for M&E as it is an essential step for successful EIDM implementation (Gillespie et al., 2016; Holdsworth et al., 2014; Lachat et al., 2015; Neufeld et al., 2019; Potvin et al., 2005).

Promotion of M&E calls for improved advocacy and communication on the importance of this step (which can be carried out by setting a national nutrition agenda) (Van Royen et al., 2013), and research capacity-building in M&E of nutrition interventions (Holdsworth et al., 2014; Lachat et al., 2015). Moreover, M&E to assess the impact of an intervention, especially nutrition-sensitive interventions, requires the collection of the targeted communities' insights (Holdsworth et al., 2014; Neve et al., 2021; Pradeilles et al., 2019) . The importance of M&E of nutrition interventions is recognised by some funders, such as European Commission (EC) or the Foreign, Commonwealth and Development Office (FCDO - previously Department for International Development (DFID)) that provide financial support for the M&E of nutrition interventions (Holdsworth et al., 2014). Communities can also be important actors for motivating political engagement towards nutrition issues and gaps for improvements of interventions that are insufficiently addressed (Innvaer et al., 2002). However, it has been reported that CSO involvement in nutrition public policies is lacking in LMICs (Gillespie et al., 2016). Therefore, the empowerment of CSOs could contribute to the priority setting of nutrition issues, while improving the inclusivity needed in nutrition science and for EIDM implementation (Gillespie et al., 2016, 2013; Kimura, 2013; Mozaffarian et al., 2018; Penders et al., 2017; Pradeilles et al., 2019; Scrinis, 2016, 2015, 2013, 2008; Van Royen et al., 2013).

Another financial constraint linked to the priority setting of funders is the under-sourcing of research appropriate to the targeted context (Bowen et al., 2009; Innvaer et al., 2002; Laar et al., 2015; Motani et al., 2019; Orton et al., 2011). This type of research is essential to answer the inherent context variability in which EIDM occurs, and advocacy or better communication from researchers should also be directed towards funders (Benson, 2008; Bryce et al., 2008; Van Royen et al., 2013) and early engagement of funders in the nutrition research priority-setting to better understand its relevance and benefits (Hawwash et al., 2021).

Commercial drivers may also influence choices of policy action by decision makers (Gillespie et al., 2016, 2013; Nisbett et al., 2014) when funding emerges from a public-private partnership and is influenced by multinational interests (Brown et al., 2014; Penders, 2014). Risks are, for example, that pressure emerges from an unavoidable trading partner with potential commercial retaliation, thus impacting the country's economy and risking increased poverty and, consequently, increased malnutrition burden. An example of this asymmetry of power and incentives between governments and multinationals are the efforts of transnational manufacturers of energy-dense and nutrient-poor foods in undermining and preventing public policies addressing overweight and obesity (Gillespie et al., 2016). Or non-respect of the International Code of Marketing of Breast-milk Substitutes forbidding infant formula marketing and distribution to infants under 6-months-old (Crowther et al., 2009), but is still aggressively marketed by the manufacturers and distributors of formula, provided in health institutes and promoted by health workers, predominantly in LMICs (Gillespie et al., 2016; Lacerte et al., 2017) and as observed in Brazil (Potvin et al., 2005). Many researchers recommend that governments take measures to proactively regulate the private sector to lift this EIDM barrier (Gillespie et al., 2016), but attention must also be given to limit the risks of diminishing the available funding as it is strongly needed, especially in LMICs (Bowen et al., 2009; Innvaer et al., 2002; Lachat et al., 2014; Motani et al., 2019; Orton et al., 2011).

4.5.4. Challenges and facilitators linked to nutrition research and decision makers' capacity

4.5.4.1. Challenges linked to nutrition research and decision makers' capacity

On the one hand, there is a lack of evidence adapted to local contextual requirements and priorities (Aryeetey et al., 2017a; Holdsworth et al., 2016; Morris et al., 2008; Motani et al., 2019; Resnick et al., 2015; Shroff et al., 2015; Verstraeten et al., 2012) or that evidence is mainly descriptive, and hence does not provide intervention-related knowledge to support policymaking (DFID, 2010; Innvaer et al., 2002; Lachat et al., 2015; Morris et al., 2008; Pelletier et al., 2018). On the other hand, there is a lack of accessibility to evidence when it does exist. This can be linked to researchers insufficiently addressing decision makers' needs and not considering for whom they are conducting their research, which is exacerbated by insufficient capacity (such as time and competency) of decision makers and their support services to use or identify the appropriate evidence available, and sometimes, an insufficient willingness to do so (Aryeetey et al., 2017b; Gillespie et al., 2016; Holdsworth et al., 2016; Motani et al., 2019; Shroff et al., 2015; Williams et al., 2010). In addition, there is a lack of inclusion of actionable policy recommendations within the summaries of scientific publications, which hampers EIDM implementation as this could save time for the decision makers and support services, while improving their ability to identify the adequate evidence (Bowen et al., 2009; Innvaer et al., 2002; Motani et al., 2019; Orton et al., 2011).

4.5.4.2. Facilitators linked to the nutrition research and decision makers' capacity

For decision makers and their supporting services (i.e. human resources of the infrastructures related to the nutrition-related political process), improved capacity is essential in identifying adequate evidence to support policies and understanding of the benefits of nutrition-sensitive entry points, which can facilitate the relationship between researchers and decision makers and allocate the attention or funding accordingly to scientific recommendations. For researchers, there is a need to improve capacity in understanding the policy environment for integrating these concerns in the evidence production process that is adapted to the context, and better communication of scientific findings and policy recommendations. On both actors' end, this calls for enhanced leadership for coordinated actions to be aware of the various drivers and needs (Aryeetey et al., 2017b; Gillespie et al., 2016, 2013; Holdsworth et al., 2016; Motani et al., 2019; Nisbett et al., 2014; Resnick et al., 2015; Shroff et al., 2015; Williams et al., 2010).

In addition, the importance to collect and act upon the "lived experiences" of the populations affected by malnutrition for more effective, sustainable, resilient and equitable nutrition action is increasingly recognised. How to effectively collect these "lived experiences" is seen by some researchers to be at the core of the 2021 UN Food Systems Summit[15] as to a vital source of information for food system changes[16]. It reflects the need for inclusiveness of nutrition action, rethinking concertation strategies that can stimulate efficient sharing and acknowledge the value of this knowledge for effectively integrating it in nutrition research at its root of evidence production. A wide range of qualitative methods (e.g. in-depth interviews or photo elicitation) can provide useful insight for including "lived experience" knowledge to inform policies. It is essential that policy-makers pay more attention to this type of evidence, generate more demand for it to be translated into policy recommendations and inform their policies (Neve et al., 2021).

Clear translation of evidence through policy recommendations within summaries of scientific findings can be a vector to stimulate the political will in engaging in EIDM (Benson, 2008; Bryce et al., 2008; Van Royen et al., 2013) by improving the understanding of decision makers in the nutrition topics targeted by researchers, while facilitating the identification of adequate evidence (Bowen et al., 2009; Innvaer et al., 2002; Motani et al., 2019; Orton et al., 2011). The use of KBs is promising approach for enhancing a knowledge translation strategy. KBs (also known as research navigator, research liaison officer, knowledge translator, research

[15] https://www.un.org/en/food-systems-summit

[16] https://www.thebetterfoodjourney.com/blog/lived-experience-as-food-systems-science

broker or boundary spanner) are individuals, organisations or structure that act as a liaison between the research community and policy sphere with the purpose of making research and practice more accessible to one another (Ward et al., 2009). Some evidence shows that KBs improve knowledge, skills and engagement of public health professionals for EIDM (Dobbins et al., 2018; Elueze, 2015; Leeman et al., 2015). Hence, KBs present an optimistic opportunity for facilitating EIDM among nutrition public policy decision makers and prioritise adequate research and interventions by enhancing the transparency and overall communication of evidence sharing from researchers to the policy sphere (Langeveld et al., 2016). Researchers also need to explore the best way to provide synthesised evidence, e.g. evidence maps, systematic reviews and rapid reviews (Booth et al., 2016) to meet decision makers' priorities, which should help reduce the risk of research waste (Aryeetey et al., 2017a; Holdsworth et al., 2016).

For building research capacity on producing intervention-related knowledge to support policymaking (DFID, 2010; Lachat et al., 2015; Morris et al., 2008) and M&E, or for delivering more efficient recommendations to support EIDM, it is argued that strengthening the research training in undergraduate/postgraduate programmes in nutrition could improve skills in evidence synthesis and ultimately the volume of evidence produced (Brown et al., 2010; Motani et al., 2019; Williams et al., 2010). Some taught programmes have used lessons learned from successful examples of EIDM, such as the "Prospera Program of Social Inclusion" conditional cash transfer programme in Mexico (Neufeld et al., 2019) or the breastfeeding promotion intervention in Brazil (Potvin et al., 2005). Furthermore, the use of more existing e-learning facilities (e.g. the eNutrition Academy, "Health Technology Assessments: Choosing which treatments get funded"[17] and "Measuring and Valuing Health"[18] by the University of Sheffield) and offering e-learning courses integrated into university modules in LMICs is also considered a favourable solution for cross-sectoral and cross-country nutrition research capacity building (Holdsworth et al., 2016; Motani et al., 2019) and is particularly relevant in the Covid-19 pandemic context.

Overall, the presence of numerous stakeholders (NGOs, donors, CSOs, etc.) and the context-related traditions, values and economic constraints make up the environmental and organisational characteristics of EIDM implementation (Davies, 2005; Holdsworth et al., 2016; Satterfield et al., 2009; WHO et al., 2008). Improved capacity of the nutrition research community in understanding the intricate web of relationships, power struggles, and complex underlying drivers of advocacy, policies and funding of research is essential for providing adequate support for EIDM. This complexity requires multidisciplinary and multi-sectoral technical capacity for answering the demands of various actors and their potentially divergent agendas, as well as improved leadership at all stages of the policy process for managing this plurality, in order to enable successful implementations of EIDM (Gillespie et al., 2016; Holdsworth et al., 2016; Resnick et al., 2015).

Discussion

Among the scientific community, EIDM is increasingly recognised as a promising strategy to improve the nutrition-related health outcome of populations, but its process is influenced by a wide range of factors. Barriers to EIDM implementations are numerous, but as nutrition issues are increasingly recognised as a global priority (especially regarding the central role of nutrition in many SDGs[19]), the scientific effort towards addressing these barriers delivered several facilitators for improving the EIDM process.

[17] https://www.futurelearn.com/courses/hta#section-overview

[18] https://www.futurelearn.com/courses/valuing-health#section-overview

[19] See at: https://scalingupnutrition.org/nutrition/nutrition-and-the-sustainable-development-goals/nutrition-at-the-heart-of-the-sdgs_001/

Nonetheless, some facilitators have not been identified in the scientific literature. Firstly, the high turnover of elected political staff and its consequences on the relationship between decision makers and researchers related-issues have been identified (Bowen et al., 2009; Innvaer et al., 2002; Motani et al., 2019; Orton et al., 2011) but are difficult to address due to the interpersonal dimension and necessary repetition of relationship building (including the understanding of the established cooperation processes and the building of trust). Initiatives such as the SUN consultation platforms aim to institutionalize the relationship between researchers and decision makers in the long run[20], and tools or methods aim to provide systematic approaches for multi-stakeholder nutrition research priority-setting processes (Hawwash et al., 2021). But it is difficult to determine a comprehensive systematic protocol to overcome the high turnover of elected decision makers. Connecting governments with major international organisations (such as the FAO or WHO) which have a strong legitimacy halo, compared to smaller-scale research organisations or networks, appears to be a solid basis for motivating political engagement. This underlines the influence that some initiatives have, such as the UN Decade of Action on Nutrition (2016-2025), and the need for strongly led nutrition actor networks that take into consideration the various context-related dynamics and multifactorial drivers or needs of policies and politics (Baker et al., 2018).

Successful EIDM implementation calls for an intricate multidimensional organisation through "top-down" leadership and action based on a "bottom-up" identification of evidence needs. Nonetheless, this process for motivating political engagement through improved nutrition policy recommendations is not compulsory, so it does not guarantee effective decision-maker undertaking of actions that will achieve the set (or to be set) targets of the global nutrition scientific community. This leads to the question of which actor or entity should take on this complex leadership responsibility and on which criteria of legitimacy it needs to be based.

Moreover, in the food system perspective promoted by the UN Food System Summit[21] and the SDGs[22] for addressing global malnutrition, sustainability and resilience are large and? key strategic targets. Other major global challenges have an impact on the overall sustainability and resilience of communities, for example, SDG14 (Life below water, e.g. the risks of consumption of contaminated fish by the plastic accumulation in the seas or overfishing and poverty aggravation consequences of small-scale LMICs local fishermen). As all the SDGs challenges are interconnected, it suggests that the efforts for improving sustainability and resilience of food systems and communities need to not only include cooperation with all nutrition stakeholders, but with the integrity of the stakeholders linked to all 17 SDGs. In addition, the targets of the different SDGs can be in contradiction (e.g. SDG 3.4 calls for imposing taxes on energy-dense nutrient-poor foods and SDG 8.5 argues that taxes may affect employment, or SDG 8.1, economic growth). Hence, increasing the complexity of the process and questioning how such cooperation can be concretely effective. This further stresses the need to address global challenges in a systems thinking approach and extensive consideration for the contextual factors to manage the improvement of all issues in the most equitable way (Hangoma and Surgey, 2019).

Finally, shifting the political framework for supporting and improving nutrition-related EIDM requires substantial advocacy efforts from the research community (Benson, 2008; Bryce et al., 2008; Van Royen et al., 2013). Researchers overlapping roles in their duty to provide quality and neutral research evidence (Weber, 1965), whilst accounting for their implication as advocates in the policymaking arena, blurs the boundary between research and politics. This boundary is at the essence of the legitimacy in using evidence to support decision-making according to the "*objective epistemologies"* perspective (in opposition with the "*political epistemologies"* perspective) and questions the delimitation of researchers' role in the political

[20] See at: https://scalingupnutrition.org/

[21] See at: https://www.un.org/en/food-systems-summit

[22] See at: https://sdgs.un.org/goals

process (Strassheim, 2015). Numerous studies extensively analysed the evolution of the researchers' role and their effective and perceived (by the general public) legitimacy in taking part in the design public policies (e.g. Eyal, 2019). As doubts in the credibility of nutrition scientific findings is still present and an overall mistrust in the scientific community is exacerbated by the Covid-19 pandemic (Eichengreen et al., 2021; Freeman et al., 2020), specific impacts of this evolution of mistrust on nutrition EIDM should be investigated, given the impact public opinion can have on decision makers' choice of action and the potential impact of subsequent nutrition interventions.

Conclusion

EIDM is a promising framework that aims to efficiently alleviate the burden of malnutrition, affecting predominantly LMIC communities. But it is a complex process that requires the implication of numerous actors, a detailed understanding of the political environment, and subsequently, strong capacity building and leadership. The various challenges to EIDM implementation have different magnitudes and require action at all levels of policymaking but cannot be addressed simultaneously. For example, inclusion of clear policy recommendations within the summaries of scientific findings can be addressed more easily than the structural and systemic challenges related to the political economy. In addition, the political environment is not static or anodyne, and its evolution influences the pertinence or compliance of policy recommendations. Overall, EIDM implementation requires working within a food system framework and putting effort into building an enabling and flexible environment for researchers and decision makers' collaboration in defining and implementing public nutrition policies.

The NRF aims to support EIDM implementation by collecting needs in evidence among decision makers, establishing a nutrition research agenda and producing research (including M&E) with subsequent policy recommendations. In terms of fostering a dialogue between researchers and decision makers, to date, a mini-symposium and four workshops have taken place with stakeholders from the SSA partner countries that priorities nutrition in their cooperation with the EU. This enabled relationship-building to begin between the NRF, other similar initiatives and decision makers, for identifying gaps in knowledge related to malnutrition. As a first step of the EIDM process, the aim of these discussions is to stimulate demand from decision makers and propose innovative methods for enabling an environment that improves relationships and understanding between researchers and decision makers. The present review provides an overview of the concept of EIDM, its challenges and facilitators for subsequently supporting the reflection on optimal strategies for implementing EIDM.

Limitations

The objective of the present review was to discuss non-comprehensive theoretical knowledge on nutrition-related EIDM. The inclusion of other databases (e.g. "Scopus" or "Embase") and ones more focused on social sciences (e.g. "Cairn") could have provided additional inputs from relevant research papers. In addition, the practical analysis of EIDM implementation can be enhanced through further developing the key words search strategy in order to be better adjusted to the used databases. It is suggested that a subsequent analysis focusing on EIDM implementation process, methods and tools (i.e. participatory involvement of decision makers in defining research priorities using evidence-informed Delphi-based methods) in one or two case study countries, through an in-depth qualitative analysis, could provide supplementary information useful for supporting NRF's activities.

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Annex

Research protocol

Narrative review protocol: *"What is meant by evidence-informed decision-making (EIDM) in the field of nutrition and what are its main challenges?"*

Background: The scientific consensus now recognises that malnutrition needs to be addressed by tackling its immediate and underlying determinants through nutrition-specific and nutrition-sensitive interventions. It is strongly recommended that these interventions be accompanied by enabling environment policies, laws and regulations (Bhutta et al., 2013; Holdsworth et al., 2014). Multisectoral collaboration, increased political commitment and funding are essential for achieving the Sustainable Development Goals (SDGs) and World Health Assembly nutrition targets. The growing interest for this issue drives the increased presence of the evidence-informed decision-making (EIDM) topic in the food security and nutrition research agora (e.g. Aryeetey et al., 2017; Holdsworth et al., 2015; Lamstein et al., 2016; WHO/UNICEF, 2020). The production of quality evidence that is adapted to context-specific needs, while being accessible to decision makers, is key to EIDM nutrition public policies (Aryeetey et al., 2017b; Holdsworth et al., 2016, 2014). But difficulties in appraisal and general perception of quality evidence have been identified linked to the recentness of modern nutrition science (Mozaffarian et al., 2018), its needs and requirements in methods of evidence production (Aryeetey et al., 2017b; Johnston et al., 2019; Mann, 2010), and its entanglement in many controversies, debates and confusion (Fischler, 1990; Kimura, 2013; Nestle, 2016; Scrinis, 2013).

Within the prism of the sociology sciences and controversies, this review aims to present an overview of the concept of EIDM for nutrition policy through an understanding of what is meant by "evidence" in nutrition science in contrast with public health or medicine "evidence", explore the epistemology of EIDM for its use in nutrition public policies and its challenges. The eventual aim is to discuss the implications of the current evidence in the literature on the potential effects of the identified challenges of nutrition evidence have with their use for EIDM.

A narrative review will be carried out, without geographical limitations within an iterative and non-exhaustive process, in order to identify the key terminologies and theoretical frameworks. The purpose is to describe the current state of the art on the area of inquiry, while providing a critical analysis of the topic's standing work. The outcome of the review is expected to lead to a discussion and a better understanding of what are EIDM in the field of nutrition.

Review questions:

1. What is meant by "evidence" in the field of nutrition, in contrast with the field of public health or medicine?
2. In the field of nutrition, what is meant by evidence-informed decision-making, in contrast with evidence-based decision-making, evidence-informed policymaking and evidence-based policymaking?
3. What are the main challenges linked to evidence-informed decision-making in the field of nutrition?

Search strategy: The search will be conducted using the following keywords: "evidence in nutrition"; "evidence-based decision-making nutrition"; "evidence-informed decision-making nutrition"; "evidence-based policymaking"; "evidence-informed policymaking nutrition"; "evidence-based nutrition"; "epistemology of evidence-informed decision-making nutrition"; "evidence-informed decision-making nutrition challenges"; research-driven nutrition policy".

The following databases will be used; “Google Scholar” and “PubMed” and through reference list follow-up and papers shared among the review team.

Project timetable:

Task	Timescale
First project team meeting	19th of January 2021
Finalise scope	January 2021
Preliminary literature search	January-February 2021
Second project team meeting	15th of February 2021
Full literature search and reference management	February-March 2021
Synthesis and analysis	March 2021
Third project team meeting	22nd of March 2021
Synthesis and analysis	March-April 2021
Fourth project team meeting	21st of April 2021
Synthesis and analysis	April 2021
Finalisation of the draft manuscript	30th of April 2021
Finalisation of the manuscript	19th of May 2021

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Type and method for the review: Narrative literature review.

Actual starting date: 19th of January 2021.

Anticipated completion date: 30th of April 2021.

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