

## **Executive Summary:**

The nutritional status in sub-Saharan Africa has not improved like in other regions of the world. To guide action in nutrition in sub-Saharan Africa, it is essential to identify priorities for investment in nutrition. The SUNRAY "Sustainable nutrition for Africa in the years to come" has developed a nutrition research agenda as defined by a wide range of African stakeholders in nutrition and a revised approach for action to organise nutrition research on the continent. SUNRAY was funded by the EC and was conducted from 1/1/2011 till 31/12/2012.

First, a state of the art analysis of nutrition research in Africa was conducted. Nutrition research published from Africa shows how the evidence base is generally focused on treatment and technical solutions to nutritional problems. This is in contrast with a clear demand from African stakeholders in nutrition to carry out community-based interventions to prevent, nutritional problems. In addition, African researchers consider that the current nutrition research agenda is driven mainly by funding bodies from outside Africa and call for additional efforts to promote cross-African networking of researchers, multi-disciplinary research as well as interactions between researchers and policymakers.

This information served as input for a second phase of priority setting and consensus building. African nutrition researchers and government staff participated in three regional workshops in Africa to define thematic priority areas for nutrition research. The findings were further developed with stakeholders in nutrition research during an international consultation round.

Three priorities areas for nutrition research were identified:

- (i) Community interventions
- (ii) Behavioural strategies and
- (iii) Food security interventions to improve nutrition and prevent malnutrition.

Four priority actions to establish an enabling nutrition research environment were shortlisted:

- (i) Better governance of nutrition research,
- (ii) Alignment of nutrition research funding with African priorities,
- (iii) Increased capacity development for nutrition research, and
- (iv) Enhanced information and communication of nutrition research.

A systematic approach is needed to rationalise nutrition research in sub-Saharan Africa on a long-term basis. We propose a revised approach where efforts for effective nutrition research in Africa are based on documented knowledge gaps through a process of evidence based analysis of policy questions. This approach will ensure that nutrition research is responsive to policy needs, promote governance of nutrition research, trigger commitment to nutrition research priorities from an African perspective and a rational dissemination of nutrition research findings.

## **Project Context and Objectives:**

Improving nutrition is a priority for both the human health and development in sub-Saharan Africa [1]. Progress towards alleviation of malnutrition in the region, has remained inadequate [2]. Despite considerable economic growth [3], the nutritional status of the sub-Saharan Africa population has not improved like in other regions in the world [2]. In addition to a persistent high rate of undernutrition, the prevalence of diet related chronic diseases has emerged as a public health issue in various parts of Africa [4]. This situation is exacerbated by emerging environmental threats including climate change, urbanisation, migration, water and land availability as well as globalisation. These developments are all likely to have a profound impact on nutrition in Africa and will require effective and innovative measures to mitigate their impact on the continent [3].

Against this background, international commitment to address malnutrition is gaining momentum [5]. The Scaling Up Nutrition movement was launched and currently mobilises over 100 stakeholders worldwide to fight hunger and malnutrition [6]. Initiatives such as the Bill and Melinda Gates Foundation [7], the Global Alliance of Improved Nutrition [8], and REACH [9] dedicate substantial funds and efforts to improve nutrition in developing countries and have become important players next to the existing UN-organisations. The need to rationalise the growing number of global nutrition initiatives however, is considerable [10].

## **Objectives:**

To guide action in nutrition in sub-Saharan Africa, it is essential to identify priorities and develop an African knowledge base for change. SUNRAY first presents priorities for a nutrition research agenda as defined by a wide range of African stakeholders. Secondly, it proposes a revised approach for action.

To produce a new, sustainable nutrition research agenda for sub-Saharan Africa, five concepts were integrated

### **1. A vision towards a future landscape of nutrition in Africa**

The future landscape will be very different in 5, 10 and 15 years time compared with the present. New nutritional problems and nutritionally vulnerable groups will emerge and as a result pose new challenges for nutrition research and programming. It is essential to understand the future environmental, economic, socio-cultural and political landscape in order to predict their impact on nutrition and identify emerging research needs as well as immediate research challenges;

### **2. Sustainable and broad-based solutions**

Nutrition cannot exist in a vacuum but needs to be integrated within other sectoral areas such as agriculture, health, education and rural development. Furthermore, solutions to nutritional problems need to be sustainable over the long-term and go beyond the 'technological fix' or 'treatment' approach. This will require an understanding of and engagement with broad-based organisations that will incorporate nutrition within a wider research agenda;

### **3. African centre of gravity**

African institutions need to identify their own research opportunities and constraints in order to ensure appropriate and sustainable solutions

to African problems. The constraints and opportunities for African institutions need to be understood to ensure empowerment and identify appropriate capacity development mechanisms for future research;

#### **4. Broad stakeholder involvement**

The link between research and action needs to be strengthened and for this a broad stakeholder viewpoint is needed. This will also help to fully understand nutrition research needs, opportunities and constraints. Stakeholder groups include African governments, businesses, administrators, health professionals and public interest non-governmental organisations and research institutions as well as Northern-based organisations (bilateral donors, United Nations agencies, international non-governmental organisations, universities and research institutes), and

#### **5. Political engagement**

Policy-makers at the highest level need to be persuaded that investment in nutrition is essential. Research needs to provide the evidence for action and present research findings in a clear and irrefutable manner so that action becomes imperative.

#### **Specific objectives**

The specific objectives of SUNRAY are:

1. To map current (academic and applied) nutrition research activities in Africa;
2. To identify the priorities and understand the operating environment for nutrition research in Africa from the perspective of a wide range of stakeholders;
3. To identify how environmental changes will impact on nutrition in Africa and the challenges for future;
4. To identify and prioritise future nutrition-related research needs in Africa for the next 15 years;
5. To develop a 'roadmap' for decision makers and donors that sets out a strategic framework for nutrition research priorities in Africa, and funding and resource requirements at a regional and international level, and
6. To consult widely and disseminate outputs in order to attain the highest level of political engagement.

#### **References**

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## **Project Results:**

The knowledge generated by the SUNRAY project principally relates to 3 different aspects of nutrition research in Africa:

- (i) an identification of emerging environmental challenges and their impact on nutrition in Africa
- (ii) an assessment of current nutrition research in Africa and
- (iii) priorities for nutrition research in Africa.

The section of this report is structured according to these lines and concluded with a short reflection on perspectives and new initiatives that have been generated by the SUNRAY project.

## **CHALLENGES OF NUTRITION RESEARCH IN AFRICA**

One of the key activities of the SUNRAY project was to identify challenges for nutrition research vis-à-vis emerging environmental challenges that impact on nutrition in Africa. For this purpose, various background papers were commissioned from experts in these fields. The results of this analysis are described in a comprehensive online document entitled "Challenges for nutrition in sub-Saharan Africa and video material of author testimonials. The background documents for the SUNRAY and video material are publicly available from the SUNRAY website.

Following conclusions with regard to challenges of nutrition research in Africa were drawn:

### **- Climate change and potential impact on nutrition in Africa**

Climate change represents a major threat for the coming decades particularly in Africa, which has more climate sensitive economies than any other continent. Climate-related risks have significant impacts on African populations and economies and drive large allocations to emergency resources. The current drought in the Horn of Africa that triggered famine in Somalia and spurred food crises in others countries is likely an indication of what may come as such incidents become more commonplace, with extreme weather events having a higher probability of occurring as a result of climate change.

Despite its relevance and interlinked impact, there is no broadly accepted and comprehensive analytical framework for the analysis of the impacts of climate change on food and nutrition security. Thus, the research agenda proposed stress this point and beyond.

The basic research needs identified in the paper are the following:

- (i) analyse nutrition security in a multi-sectoral comprehensive manner;
- (ii) study specific overlooked sectoral issues and their interplay with undernutrition and nutrition in the context of climate change;
- (iii) provide consistent prediction model and data of undernutrition (wasting, stunting, underweight) in a changing climate continent;
- (iv) monitor the interplay between climate-related hazards (i.e. climate-related shocks, seasonality and trends) and nutrition,
- (v) develop tailored early warning systems; identify effective adaptation actions for nutrition under a changing climate; and
- (vi) analyse and monitor the synergy opportunities and the threats of climate change mitigation measures on nutrition and identify and suggest how to strengthen institutional capacity and the policy framework.

## **- Trends in international, regional and domestic agricultural and food markets, and potential impact on nutrition in Africa**

A combination unfavourable international trade rules and inadequate national policies are enlarging the food and nutrition vulnerability of African poor communities, particularly in the rural sector. After the food prices' spikes of the last decade, the continent faces the challenge of multiplying its agricultural yields while being the battlefield of a new global scramble for productive natural resources such as land and water. All these factors could drive up the price of basic staple foods like maize by as much as 180%. The current trade system is identified as an obstacle for change, and its reform is key to succeed in the battle against hunger and malnutrition. A number of policy areas need to be further explored in order to increase the positive relationship between trade and agricultural policies and nutrition levels in Africa.

The findings of this analysis point towards three specific issues in this regard:

- (i) how to build a system of global, regional and national food reserves in Africa;
- (ii) how to expand social protection mechanisms in Africa in order to increase the resilience of poor producers and consumers; and
- (iii) the impact of land grabbing on the production and access to food.

## **- Socio-demographic changes and potential impact on nutrition in Africa**

Demography changes have an enormous impact on nutrition at different levels. Increases in population, fertility decline, lowered death rate, slow increase of old people and increased youth proportion are some of these demography changes. Though these changes are arguably the same, there are still some changes in Sub-Saharan Africa by countries and residence type. These differences and changes have created vulnerable sections of people who the change in demography affects more than others in terms of nutrition. The analysis indicates how nutrition research in Africa needs to have a population-based approach that understands all the different implications linked to demographic changes.

In terms of concrete research agenda, the most important research priorities are:

- (i) a review of the current African strategy to combat population socio demographic changes in relation to the quality of life as indicated by health and nutrition status of the citizens,
- (ii) research on the current nutrition policies and plan of action of African countries in relation to population and health policies, implementing frameworks, monitoring and evaluation mechanisms as well as challenges to implementation,
- (iii) research on gender mainstreaming in sustainable diets based on culture, biodiversity and-child friendly sensitive programs to combat malnutrition,
- (iv) study the effects of urban renewal to establish good nutritional habits and practices in these slums, especially with the possible loss of cultural ties and
- (v) study the roles of different institutions and agencies to identify opportunities to promote implementation of policies and plans of actions that would allow collaboration.

## **- Social dynamics and potential impact on nutrition in Africa**

Social dynamics plays an important role both as a cause and solution to Africa's nutrition challenge. Social dynamics impacts on nutrition directly and indirectly through social change in at least four main ways. First, it affects whether or not a nutrition situation is perceived and accepted as a problem, and, therefore, the need for it to be addressed. An agreement on the existence of a problem is a prerequisite condition for addressing it. Secondly, social dynamics creates the language used in assessing, analysing, acting, advocating and researching on the nutrition problem. Thirdly, social dynamics determines the type of social change actions and approaches needed to address the problem of malnutrition including the roles played by different actors. In this context, social change refers to acts of advocacy that change society in ways that positively impact on nutrition. Fourth and last, social dynamics creates the political, social, cultural, economic and technological space and environment required for effective and sustainable approaches to nutrition including climate change considerations.

Human societies in Africa have undergone fundamental social changes in both rural and urban areas. These changes, driven by:

- (i) demography and the natural, physical, social and financial environment (including globalisation, modernisation and urbanisation),
- (ii) economic, political and ideological choices,
- (iii) formal and informal institutions, including markets and service providers are likely to impact on nutrition status in African households and communities.

In addition, a digital and social revolution challenges the traditional social norms and structures and offers innovative ways to stimulate social cohesion and equity. Household dynamics (values, beliefs, culture, traditions, decision making mechanisms and trade-offs) potentially change the way households produce, access and utilise food, livelihood strategies and assets (including pre- and post-shock strategies), their social resilience, access to health services (including beliefs and traditions on management and treatment of disorders) and maternal and child care and feeding practices to name just a few. In addition, changes in community dynamics (i.e. gender, stigma, benefits and opportunities for women leadership) have important repercussions on household nutrition and food security. These dynamics are often not revealed by conventional statistical methods as not everything that counts can be counted.

#### **- Cross-cutting findings**

The analysis of the emerging challenges and their impact on nutrition generate a number of cross cutting findings. First, despite its relevance and interlinked impact, there is no broadly accepted and comprehensive analytical framework on the analysis of the impacts of issues such as climate change, trade, demographics, water etc. on nutrition. Second, once the impact of the different issues on nutrition has been analysed, it's necessary to analyse nutrition from a broad perspective to have a better understanding of the different links.

## **ASSESSMENT OF THE CURRENT NUTRITION RESEARCH IN AFRICA**

An assessment of the current nutrition research landscape in Africa was conducted from three different angles. First, the barriers and requirements for conducting nutrition research in sub-Saharan Africa were identified through interviews with Africans involved in conducting nutrition research. Second, a review of nutrition research carried out in Africa during the last decade and published in the scientific literature was conducted. This review assessed the research topics, study designs, and authorships. Lastly, African stakeholders' views on research priorities were analysed in view of developing a research agenda based on broad stakeholder involvement and fostering strong links between research and action. The assessment of the current nutrition research in Africa is documented as 3 academic papers.

### **- The views of African researchers on actions to improve the operating environment for nutrition research**

People actively involved in nutrition research in sub-Saharan Africa, either as academic or as a member of an international organisation, Non-Governmental organisation or a public body respondents were recruited by using a snowball method, i.e. referral from primary recruits of the networks such as ANLP or FANUS to other relevant respondents. In total 133 semi-structured interviews were carried out with researchers in 35 different countries. Interview transcripts, were coded for recurring themes and themes were grouped into categories of similar meaning.

The majority of researchers perceived the profile of nutrition research in their country as rather weak, mainly due to the lack of interest and support of the government. Furthermore, research findings were seen to be underutilised by governments because of limited interaction between researchers and government and because of capacity constraints to conduct the kind of research that is needed to solve problems specific to sub-Saharan Africa. Researchers argued for greater involvement of governments in nutrition research, including recognition of the importance of nutrition issues, financial support and national priority setting. Capacity building was perceived as fundamental, especially in terms of human resources. International donors are currently the main funders of research and are often perceived as funding research in line with their own agenda.

"In institutions like ours, we can't do research when there is no money, so the topics are always oriented towards the financed areas. But are the funded areas priority and beneficial for the population?" Female academic, 35 years, Benin.

Example of a response from the SUNRAY researcher interviews 2011

Conducting nutrition research was not regarded as a national priority, which the nutrition researchers interviewed saw as a consequence of a lack of attention given to nutrition research by governments. The lack of attention was in part attributed to their limited understanding of the benefits of adequate nutrition for development, confirming previous reports [1,2]. Moreover, the researchers indicated that the current political environment for nutrition research tended to be reactive and directed towards emergency situations. Effective emergency responses were certainly considered indispensable [3], however these short-term solutions alone will not enable communities to become self-sufficient and



food secure [4]. This argues for a long-term and proactive plan for nutrition research to be designed, in which emphasis should be placed more on prevention than on treatment.

"Researchers should be given a platform to air the research results, not just in scientific gatherings or conferences. If there are platforms where nutrition researchers and policymakers come together and the researchers break down their research in simple language for decision makers to understand what it means." Female, 29 years, Academic, Ghana.

Example of a response from the SUNRAY researcher interviews

Nutrition researchers expressed concerns regarding the communication barriers between researchers and policymakers, which was viewed as preventing evidence from reaching the political level and partly explained the lack of demand for evidence from policymakers. Therefore, effective communication and advocacy from nutrition researchers towards policymakers was perceived as an essential ingredient. Previously, it was reported that creating political will is crucial to improve nutrition and health policy [5]. Nutrition researchers need to take the initiative and put the evidence for the current nutrition situation on the table, as personal contact between policymakers and researchers has been highlighted as one of the most important facilitators of moving research findings into policy and action [6]. Respondents in this study reiterated this idea by suggesting a coordinating body at governmental level, which could serve as a major support for the involvement of researchers in policymaking and improved interaction between policy and research.

Providing baseline data on the nutritional situation in a country is a crucial first step towards evidence-based decision-making and the development of effective interventions. Findings of nutrition research have not been fully exploited to date in policy, practice or academic publications. Evidence on the prevalence of nutritional problems might help to get nutrition on the development agenda. Pelletier et al. [5] pointed out that providing clear evidence for the size and urgency of the problem and framing the problem in a way that has political resonance are among the most influential factors to raise the profile of nutrition research. Several challenges for effective action on nutrition in developing countries, including getting nutrition on the national agenda have been reported earlier [3,5], however these have yet to be achieved according to the majority of the nutrition researchers interviewed in the present study.

The current evidence base in nutrition research in Africa is largely descriptive and falls short of providing convincing data for policymakers to initiate national action or to trigger the investment for appropriate nutrition action according to research priorities that are tailored to the African context [3,7]. Perceptions of nutrition researchers in the present study confirmed the pattern that current research needs to be more problem-driven, but often it is limited because of research capacity constraints. It has been reported that local research capacity development is one key step to ensure the use of evidence by local policymakers [8].

One of the major problems as indicated by the nutrition researchers interviewed for this study is the lack of financial support and the distortion of funds towards other priorities. Funds are often allocated

more towards treatment and other health issues, rather than to nutrition prevention. A serious distortion of research grants was previously observed, where the majority of research grants were dedicated towards the areas with the least potential impact [9,10]. In addition, various countries where health or health-related research is non-existent are overlooked by funders, who believe that they can only invest where there is sufficient existing capacity to absorb resources [10,11]. International donor organisations are the main funders of nutrition research in Africa and researchers expressed concern that their research ideas should be tuned to the interests of the funders. This reflects previous observations that the research agenda is driven by the availability of funds instead of the perspectives of finding sustainable solutions [3,10].

Shaping a national nutrition agenda was perceived as crucial to integrate nutrition research in the development agenda of sub-Saharan African countries, to redirect funding and have less fragmented research. A national nutrition agenda is effective to ensure awareness of the country priorities, and thus would help to reflect them more in international donor funding [1,10]. The role of governments is necessary in this regard, since it is the most powerful stakeholder in building ownership of a nutrition strategy at a national level [1,10,12]. Very few nutrition researchers considered local communities as necessary participating actors in shaping the agenda.

Collaboration, in particular within Africa, is another way to pool resources and to maximise the growth of knowledge on nutrition in the continent that is likely to then attract further funding. Cross-African linkages in research are limited and a considerable share of publications concerning Africa is associated with institutions that are situated outside of Africa [13]. Cross-African collaboration and increase of resource capacity will create more African ownership for nutrition research.

In conclusion, nutrition research in sub-Saharan Africa is at a crossroads. A substantial amount of effort is devoted to nutrition in the region. While national government and donors require high quality evidence to prioritise their actions in nutrition, African researchers highlight a number of key barriers to achieve this. Apart from capacity development and actions to strengthen human resources, priority setting and the development of a local research agenda based on priorities tailored to the African context needs to be a key priority. In addition, nutrition researchers state that they must have a stronger voice to advocate for political commitment in nutrition research in their country, supported by a coordinating body for nutrition research to increase the interaction between researchers and policymakers and consequently facilitate validation of research findings. Investment in multidisciplinary and international collaboration, with cross-African linkages, offer important avenues to support the research capacity in sub-Saharan Africa.

#### **- A decade of nutrition research in Africa: assessment of the evidence base and academic collaboration**

To review nutrition research published from Africa, two consecutive steps were followed. First, the global volume of studies published between 2000 and 2010 was assessed through a Medline and Embase search syntax. Secondly, a more in-depth analysis a set of topics considered of public

health importance for Africa was conducted for breastfeeding, micronutrients, vitamin A deficiency, protein-energy malnutrition, obesity, nutritional status and food security. To do so, a specific search filter was applied to extract papers from the database, which had those terms tagged as "Major topic" in Pubmed and Emtree. Co-authorship in nutrition research from Africa, the institutional affiliation and the country of the authors as listed on the papers were extracted manually from the full text version of the articles and visualised as a network structure. Network views in which the size of each node and connector is proportional to the number of connections were generated. The affiliation of the first author of the paper was considered a proxy for the organisation, which took a key role in the research and its publication. Powerful institutes in the network were identified using centrality measures.

The review shows how a considerable amount of publications in international indexed journals are dedicated to nutrition in Africa. Intervention studies are a minority of the studies conducted. Morris et al. [3] came to similar estimates for nutrition research published in low and middle income countries in the second half of 2005. Given the public health dimension of nutritional problems in Africa and the scarcity of resources to address them, having a considerable amount of intervention studies published from nutrition research in Africa is critical, as these generate the evidence base and guide policy makers and donors to decide on which policy options are effective and likely to impact on nutrition in Africa.

Further scrutiny of the type of intervention studies conducted shows that most of the studies are therapeutic in nature. Only a few studies tested the application of low-cost and locally available resources to prevent nutritional problems (whether it is over or undernutrition) in Africa. In addition, only few studies tested interventions on how distal determinants of nutrition status (e.g. agricultural practices, social dynamics, economic parameters) as described by [14,15] can be modified in order to improve nutrition status. A recent review on agricultural interventions to address nutritional challenges in low and middle income countries also concluded that insufficient studies with an appropriate design are available to draw firm conclusions [16]. Similarly, Bhutta et al. [17] could not include interventions with a distal link on nutrition outcomes (e.g. poverty alleviation, agriculture, demography) to estimate the effectiveness of interventions to improve nutrition status. The present study indicates how the type of nutrition research in Africa falls short to provide the necessary evidence for effective action.

It is clear that a substantial amount of this research is affiliated with an organisations situated outside Africa. The network profile shows how institutes collaborate in academic publications of research with a major focus on vitamin A deficiency. Similar findings were obtained for the other topics of nutrition research examined in this review. Overall, the first author of almost half of the studies published under an affiliation with a European or North-American institution. This might be partly attributable to training programmes outside Africa. Various African authors might have published their research in the context of an MSc or PhD training abroad. The network of authors of research papers from Africa however, indicates that root causes for this are mainly to be found at a more structural level, in particular in the role non-African academic institutions play in generating nutrition research from the continent. It is clear that significant amount of initiative and build-up

of knowledge with regard to nutrition in Africa is concentrated in non-African institutions. In addition, cross-African linkages and networking of institutions within Africa seems second to networking with institutions or organisations based in the North, in particular in Europe or the USA.

This review of academic output shows how African research response to emerging nutrition challenges on the continent is tied to that of research institutions in the North. The absence of cross-African linkages and relative lack of African clusters driving the research agenda indicates that the collaboration between African research groups might not be used to its full potential. Morris et al. [3] previously argued how investment in academic capacity to deliver nutrition research is grossly insufficient. African researchers previously indicated that non-African research institutions and donors are instrumental to determine the research agenda of the continent. Taking this into account, the findings of our analysis identifies research institutions in the North, principally USA and Europe, as brokers of nutrition knowledge in Africa. International agreements now explicitly state how development efforts need to be aligned with priorities and policies set out by developing countries [18]. Similar initiatives for academic collaboration are yet to be established. Clearly, international and intercontinental collaboration in research, when used to its full potential, can leverage scientific knowledge and capacity in Africa and help generate answers to address the complex challenges ahead. For such research collaboration to be considered a true partnership, it must rely on a balanced and complementary set of capacities [19].

In conclusion, this review shows how the evidence base for nutrition research in Africa is generally limited and focused on treatment and technical solutions to nutritional problems of the continent. Contextual and low cost solutions, developed from high quality studies and responsive to the African needs and context are urgently needed to respond effectively to the nutritional challenges of the continent. Our analysis shows how the capacity of African research institutions to publish research conducted in Africa is often tied to that of the partners in the North. The potential for cross-African networks of scientists and collaboration, to identify, implement and publish nutrition research from Africa remains grossly underutilised and deserves additional support to strengthen efforts to build capacity in the continent for effective nutrition action.

#### **- Views of African stakeholders of research priorities to address malnutrition in sub-Saharan Africa in the years to come**

To assess understanding of stakeholders' views to assist in policy development multi-criteria mapping was used [20]. Using face-to-face interviews, the method provides information not only on how different options perform, but why they perform the way they do. It has a four-part consecutive structure:

- (i) choosing options- ways to achieve a policy;
- (ii) defining criteria- the different factors that the interviewee had in mind when assessing research options, e.g. cost, impact;
- (iii) scoring options- numerical measures of how each option performs under different criteria; and
- (iv) weighting- the relative importance of the criteria in measuring the options. When stakeholders scored the different policy options they also recorded the reasons for these scores.

Six research options (Box 1) considered as relevant to their national contexts were selected. Options concerning the broad domains of research in the field of nutrition from the broadest (ecological level) through to the most narrow (molecular level) were selected. Full descriptions were given so that interviewees would have a clear understanding of what they were invited to appraise. Interviewees were also able to add additional research options of their choosing.

#### **Box 1. Research options to tackle malnutrition in sub-Saharan Africa**

##### **1. Ecological research**

Nutrition research in Africa should include ecological approaches to focus on the environmental threats (climate change, food scarcity) that Africa will face and their impact on nutritional status. This will involve conducting integrated research with nutritionists, climate scientists and agricultural researchers to improve the way land is used and our understanding of how communities respond to various exposures.

##### **2. Community nutrition interventions**

Nutrition research in Africa should prioritise improving the evidence base for effective interventions to improve the nutritional status of African populations using a participatory approach. This would require the implementation, monitoring and evaluation of nutrition interventions.

##### **3. Nutritional Epidemiology**

To investigate diet-disease relationships, studies could include:

- a) research synthesis such as systematic reviews,
- b) conducting longitudinal studies,
- c) using secondary data that are available in a country related to nutrition related deaths, hospital admissions and treatment to guide planned interventions.

##### **4. Behavioural nutrition**

Nutrition research should give priority to conducting nutrition research that incorporates other disciplines, especially the social, anthropological and behavioural sciences, such as investigating attitudes to address current public health problems.

##### **5. Therapeutic/clinical nutrition**

Nutrition research in Africa should focus on improving the ways that nutritional problems are managed. This involves treating/managing obesity, undernutrition, micronutrient deficiencies, other nutrition-related diseases and HIV. This may include the use of supplements and human feeding trials.

##### **6. Molecular nutrition (lab based)**

Nutrition research in Africa should focus on investing in basic nutrition science using new molecular, genetic and biochemical approaches, such as nutrigenomics so that science in Africa can develop technological approaches to address Africa's nutritional problems.

The assessment was conducted in Benin, Mozambique South Africa, Tanzania, Togo and Uganda. Sixteen stakeholder categories were identified from six groups comprising: civil society, food industry, government, health professionals, research/academic and research funders for the assessment, representing institutions that have an important role to play in nutrition research. We envisaged selecting participants operating at the

highest national level to represent their stakeholder group and to reflect a broad 'envelope' of relevant viewpoints. Data were gathered from 91 stakeholders. Results are presented as quantitative data in the form of charts. Charts show the average of the pessimistic (left-hand end of bar) and optimistic (right-hand end of bar) ranks, i.e. combined weighted scores for all criteria given by all participants.

Overall, impact, research efficacy and social acceptability were the 3 groups of criteria that were chosen the most to evaluate the performance of research options. Whilst practical feasibility and cost were also raised as issues by some stakeholders, they were used infrequently. The average of the pessimistic and optimistic ranks, i.e. combined weighted scores combined for all criteria given by all participants were computed. Looking at the mean ranks given by participants under the most optimistic scenarios, the most popular option under optimistic scenarios was community nutrition interventions. Qualitative data suggested that community nutrition research interventions tend to meet least political resistance, were seen as relatively low cost and an efficient use of resources, they were also seen as feasible, benefiting from existing expertise and infrastructure. In addition they were perceived as effective in improving nutritional status as well as having the social benefit of involving communities. The next most highly appraised option was behavioral nutrition. This was supported as it was seen as having the potential to have a high impact if targeted well. Participants noted that the technical expertise already existed in Africa for this type of research and that this would be a relatively cheap research option, in particular by South African respondents.

Many participants gave good scores under optimistic scenarios for ecological nutrition research. Political will for research in ecological nutrition was seen to be high, and it was viewed as useful in providing evidence for interventions and contributing overall to development priorities. However, the reasons the option did not perform better were the lack of existing infrastructure for ecological research- for both technical expertise and material. As a consequence it was seen as expensive, likely to have a slow and low impact. Participants were unconvinced that nutritional epidemiology research in its own right would have an impact in reducing the burden of malnutrition, and they expressed much conditionality on its performance, saying that it is most useful for providing evidence for the need for community nutrition interventions. The reasons for the relatively poor performance of clinical nutrition research had a different focus. It was seen as expensive by many and there were doubts that a therapeutic focus was sustainable or cost-effective in the long term at improving nutritional status more broadly beyond the patient group. However, it was also seen as offering a proven efficacy by many participants, with existing technical expertise in Africa to conduct this type of research. Research in clinical nutrition was the only option that was ranked higher under pessimistic conditions, suggesting that there was more certainty regarding its performance in different contexts. The option that performed the worst was research in molecular nutrition. Whilst some stakeholders (particularly those from South Africa) acknowledged its scientific rigor there were many concerns from other countries regarding the lack of existing infrastructure to conduct this type of research. Other reservations focused on ethical aspects, particularly regarding genetically modified organisms and a focus on individualised nutrition that was seen as inappropriate or unsustainable for Africa and unlikely to yield significant impact for Africa or be socially acceptable.

Similarities and differences emerged for the views of participants from the six participating countries. Benin, Tanzania, Togo and Uganda ranked the same options in first and last. In addition, three of these countries (Benin, Togo and Uganda) ranked clinical nutrition research in 5th place with relatively high certainty with concerns over its cost and treatment only focus. The highest level of agreement between different stakeholder groups was for community nutrition interventions, with all ranking it in first place under optimistic conditions. Only academics ranked it in second place, indicating a considerable degree of conditionality concerning how the option would work in practice under different scenarios.

The findings from this consultation exercise suggest that nutrition research funding in sub Saharan Africa should focus on investing in increasing the evidence base for community nutrition research interventions and behavioural nutrition. Despite varying infrastructures and contexts in the countries investigated, there was a great deal of consensus for research in these two priority areas. Many participants also gave good scores for ecological research and research in this area should also be considered for funding, but it was seen as more pertinent for some countries in sub Saharan Africa than others. Conducting research in clinical nutrition and in molecular nutrition were viewed as lower priorities, as they were generally seen as having a lower impact on a large scale.

Stakeholders emphasized the need to focus on evaluating nutrition interventions, which is a call for research funders and governments to introduce research policies that target effective solutions, rather than focusing on the treatment of the effects of poor nutrition, which is typically the case in sub Saharan Africa. Others [3,9] have reported that interventions are rarely seen as a research priority by funders, particularly for evaluations of existing interventions [21].

Much conditionality emerged, indicating that the impact of some research options will depend on the conditions and development context in which they are applied. Support for behavioural nutrition and ecological nutrition research indicates that the need to acknowledge societal causes of malnutrition and collaborate with researchers from other disciplines, e.g. in agriculture, climate change, sociology, geography and psychology, as has been reported by others [22]. It is widely recognized that many policies affecting health are developed and promoted in sectors outside of public health [6] so research studies need to also acknowledge this.

This raises the issue of how research co-ordination can best be achieved, and whether a centralized approach to coordinating nutrition research funding activities in sub-Saharan Africa is required. A multi-sectoral approach may be best accomplished by creating national research bodies with responsibility for nutrition, as national high-level leadership is identified as key if progress is to be made [5,23]. Such an alliance could facilitate a reflection on funding for the research options that have emerged from SUNRAY.

This exercise allowed the voice of African stakeholders in nutrition to be heard, which is crucial if calls for research funding are to reflect that which is needed. Whilst specific research priorities need to be determined at a country level, there was much agreement across sub-Saharan Africa for focusing research activity on developing effective

community nutrition interventions and on behavioural nutrition. Research funders should therefore redirect research funds towards these priorities identified by African stakeholders. This will need to be accompanied by capacity building in evidence synthesis, designing and evaluating simple and complex interventions. Expanding research funding in behavioural nutrition was also valued by stakeholders, which will require multi-disciplinary collaborations between nutritionists and social scientists.



## **PRIORITIES FOR NUTRITION RESEARCH IN AFRICA**

The final body of knowledge generated by the SUNRAY project was the priorities for nutrition research in Africa, in terms of priorities for a nutrition research agenda as defined by a wide range of African stakeholders and of a revised approach for action. This knowledge was summarised as an academic paper scheduled for submission in March 2013.

The findings from the identification of research needs for emerging environmental challenges and the analysis of the nutrition research landscape in Africa were fed into a phase of priority setting and consensus building in three regional workshop that convened 117 participants from 40 African countries. The participants of the workshop were essentially senior researchers in nutrition and policy makers. To reflect on the priorities identified, a wide range of other stakeholders in nutrition research in Africa (i.e. government officials, UN-agencies, national and international NGO's, bilateral donors, industry, small and medium size enterprises) were invited to comment and to help fine-tune the research agenda. Each workshop consisted of five sessions during which participatory approaches were used to define research priorities for nutrition research.

A report of the outcomes of the regional workshops was circulated for consultation and endorsement by the workshop participants from October 10 to November 10, 2012. This resulted in the preparation of the SUNRAY Roadmap, which described the conclusions and "way forward", building on the findings of the workshops. An electronic consultation round November-December 2012 was organised to provide feedback to workshop participants and to discuss the overall findings and recommendations of SUNRAY. The Roadmap was sent for consultation to SUNRAY regional workshop participants and a wider group of 56 non-African stakeholders, i.e. academia, multilateral and bilateral donors, UN, CGIAR, NGOS, International Union of Nutrition Societies (IUNS) and various representatives of research or projects in nutrition that were selected for their excellence or mandate with respect to nutrition research in sub-Saharan Africa.

Three priorities areas for nutrition research were identified:

Priority area 1: Community interventions to improve nutritional status

Research interventions for malnutrition have mainly focused on curative aspects and have largely ignored a sustainable prevention. Better understanding of these aspects is urgently needed. Critical success factors need to be identified and translated into policies, programs and interventions to prevent malnutrition and improve the nutritional status of Africans. New initiatives to prevent malnutrition building on locally available approaches and resources, i.e. nutrition-sensitive approaches from areas such as agriculture, social protection, education, family planning, environmental sanitation and rural economy, should be tested.

Priority area 2: Behavioural strategies to improve nutritional status

Behavioural change is considered an essential strategy to prevent malnutrition (being both under and over nutrition) and promote healthy lifestyles and sustainable diets for Africa. Although behavioural interventions rely on paradigms that require contextualisation, the knowledge base for designing and evaluating interventions in the African context originates to a large extent from non-African cultures. Although some approaches have been tested in Africa, more information on the drivers of behaviour in the African context is needed to design effective

interventions. Such research will require the propagation of multi-disciplinary research across the continent, with a representation of psychology and social sciences.

Priority area 3: Food security interventions to improve nutrition To address hunger, rural poverty and emerging environmental challenges, vast efforts to improve food security are deployed in Africa. Despite this, their effectiveness and pathways to eliminate malnutrition have been poorly documented [16,24]. To adequately address the causes or challenges of food insecurity, the sustainability of interventions and their potential to mitigate the effect of environmental challenges on nutritional status should be better understood.

Food security interventions that were perceived promising to effectively improve nutritional status included:

- (i) the promotion of traditional African foods, food systems and farming models,
- (ii) microcredit programmes or social protection programmes, and
- (iii) the strengthening of local coping, adaptation and mitigation strategies in the face of volatile food markets and climate change.

This needs to be tested.

Four priority actions for an enabling environment were identified:

Priority action 1: Better governance of nutrition research

Most participants in the workshops indicated that nutrition research was not considered to be a high priority by policy makers in their country. Research was perceived to be uncoordinated, mainly conducted for academic purposes and overall contributing poorly to the actual improvement of nutritional status or the development of sub Saharan Africa. Better governance and uptake of nutrition research is needed to ensure the practical relevance of findings, so that efforts can efficiently be targeted towards the priority areas for action. A clear integration of nutrition research in the development agenda, with an explicit articulation of priorities for nutrition research in policies in sub Saharan Africa was highlighted.

Priority action 2: Alignment of nutrition research funding with African priorities

Participants reported that African defined priorities should be the starting point for funding agencies for investment in nutrition. The current nutrition research agenda, was perceived to be driven by high-income countries. In addition, the capacity to attract international competitive funding for most African researchers was considered limited and African grants for high quality nutrition research marginal.

As such, current research in sub-Saharan Africa does not necessarily reflect African concerns. By consequence, there is a need to align funding for nutrition on the African continent with the priorities of nutrition as identified by African stakeholders in nutrition. Such alignment however, requires a clear articulation of an African nutrition research agenda and the establishment of structures to attract and channel donor funding towards these priorities.

Priority action 3: Increased capacity development for nutrition research Various international, regional and national training programmes in nutrition have been established during the past decades and produced

large amounts of well-trained professionals. Additional efforts are needed to utilise this capacity for the development of Africa (which will bring nutritional benefits) and to deliver effective answers to the nutritional challenges.

Specific capacity building efforts are required and comprise regional mobility or exchange programmes within Africa, re-entry grants for promising scientists and/or various specific courses (i.e. refresher courses, leadership, and mentorship). In addition, the current scholarship programmes from donor countries might need revision in favour of support for local PhD programs and scaling up of sandwich (academic/practical placement) programs within sub Saharan Africa. While various African countries offer advanced training courses in nutrition, including PhD programmes, high-income countries offer scholarships for training programmes outside of Africa. In view of optimising the use of support and funds, the marginal benefit to fund training abroad needs to be clarified.

Priority action 4: Enhanced information and communication of nutrition research

Generally, participants of the workshop felt isolated and unable to capitalise sufficiently on existing knowledge and international initiatives. This is surprising given the growing wealth in open access papers and freely distributed reports or guidelines from various sources. Many of the latter however, are not peer-reviewed or centralised and were considered to be of varying scientific quality. As a result, the message stream towards African nutrition researchers was not considered helpful. Therefore, a new approach is needed to rationalise the dissemination of nutrition recommendations from stakeholders such as the UN agencies, NGO's and other initiatives in nutrition in sub Saharan Africa.

Although the SUNRAY project is a sizable effort to define priorities for nutrition research in sub Saharan Africa, it is clear that a sustainable and systematic approach is needed to rationalise nutrition research in sub Saharan Africa on a long-term basis. Such an approach needs to recognise the African context, its priorities and build on the existing African academic system. It should maximise the use of available resources, including scientific knowledge, human resources, domestic and external research funding and institutional capacities and networks. In addition, it should promote good governance and use of nutrition research. Given that nutrition research and the struggle against malnutrition do not occur in a moral void, continuous attention for the ethical issues that occur in practice is essential. Setting priorities for nutrition research in Africa can hence not occur in a normative void. A centralised approach for nutrition research should generate a platform where ethical research conduct can be fostered, including issues of good research practice, transparency and conflict of interests. In addition, it would also create a solid ground to adequately identify, analyse and address ethical issues.

Among the issues that should be considered when setting and executing a nutrition agenda, are:

- (i) the independence of research agendas of foreign funding agencies or donor organisations (which do not necessarily serve the self-defined African priorities),
- (ii) the need for an adequate representation of African stakeholders,
- (iii) the just distribution of research efforts across the African continent,

- (iv) the access to the yields of nutrition research for all, and
- (v) the sustainability of efforts to reduce malnutrition.

Despite renewed attention for nutrition, there are indications that research efforts on the African continent fall short in generating the contextual knowledge for evidence for policy making and programming. The present paper identifies priorities for nutrition research and a revised approach to rationalise investment in nutrition research. It is clear that a crucial condition to improve nutrition status of populations from sub Saharan Africa is to build and strengthen strong national research systems which can engage meaningfully, over a sustained period with national policymakers, helping them use research and stimulate demand for more evidence and holding them to account for research results in policies. The renewed attention and commitments to nutrition in Africa is a great opportunity to leverage nutrition in sub Sahara Africa but it will not yield success unless traction is gained at national and sub-national levels.

## **PERSPECTIVES**

The findings of the SUNRAY project have generated various initiatives:

- A first is the organisation of an International Course on Evidence based Nutrition Organised at the Institute of Tropical Medicine Antwerp. The course was organised from 11 till 22 February 2013 and seeks to:
  - (i) build capacity in synthesis of nutritional evidence from low and middle income countries, in particular Africa
  - (ii) create a network of trainees that can be generate evidence based recommendation for nutrition policy in Africa,
  - (iii) explore opportunities for funding and collaboration to organise the course in Africa.

The first course was attended by 15 participants with a large representation of African researchers;

- A second initiative is the organisation of the action for evidence-based nutrition into a collaborative effort for evidence-based nutrition. First steps were taken in this regard with various SUNRAY partners, other African research groups, the International Network of Agencies for Health Technology Assessment and the International Union for Nutrition Sciences; and

- A third initiative was to compile a database of African nutrition researchers. A public database with contact details of African researchers, affiliations and topics of interest is expected to facilitate networking between African research groups and the development of multi-disciplinary studies. The database was prepared in the context of the SUNRAY project and arrangements are made to host the database on the website of the Federation of African Nutrition Societies for further update and consultation.

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**Potential Impact:**

The Millennium Development Goals will not be reached by 2015 in Africa unless the nutritional status of women and children improves. Despite the huge cost of malnutrition, investment in the nutrition sector and in nutrition-related research has been grossly insufficient. Future environmental, economic, technological, socio-cultural and political changes are likely to present new challenges in the field of nutrition. Future research needs for malnutrition in Africa may be very different from current research needs and will require the development of new conceptual thinking accompanied by innovative research methods. In addition, the nutrition research agenda needs to be aligned with international agreements such as the Paris Declaration and the Accra Agenda for Action. These agreements emphasise ownership by developing countries of strategies to enhance aid effectiveness. Consensus on the priorities for nutrition research and programming needs to be reached involving institutions inside Africa with support from the outside through international research partnerships and by Northern governments and non-governmental organisations.

The scope and objective of SUNRAY clearly has important implications on how African researchers can address the current challenges related to nutrition and the Millennium Development Goals in Africa. In addition, the project will contribute to developing mitigation strategies for the impact of environmental challenges on nutrition in the continent. Throughout the first year of the project, researchers and stakeholders in nutrition research have expressed a strong interest to engage in the development of a new sustainable nutrition research agenda for sub-Saharan Africa. The regional workshops in which nutrition researchers and stakeholder in nutrition research for Africa participate will not only create awareness, but also contribute to a mobilisation and empowerment of African researchers to develop an African response to the current and emerging challenges. The second year of the SUNRAY project consolidated this response in the scientific community and looked for mobilisation of African policy makers to contribute, endorse and advocate for an African sustainable nutrition research agenda for the years to come.

**List of Websites:**

<http://www.sunrayafrica.co.za>