Data Collection and analysis tools for food security and nutrition
HLPE report
V0 draft for e-consultation

The WFO Working Group on Food Security intends to offer some considerations from the farmers' point of view, as follows:

First of all, we appreciate the Report's intent to identify weaknesses and take effective action to solve a problem that significantly impacts the management and control of food safety and nutrition. The availability of certain, reliable and updated data is the tool to understand reality and intervene with public and private policies and actions in an effective and timely manner.

The achievement of the SDGs is strongly linked to the continuous measurement of the variables connected to them. Therefore, we hope that solutions can be identified to bridge the knowledge gap, also in consideration of the mandate of this analysis which, in point 4, sets out :*"Provide insights into how to ensure data collection and its utilization give voice to the people most affected by policies stemming from that data, including farmers and other food producers."*

Key role of farmers

Farmers are an essential part of the food system locally, nationally and globally[1]. Therefore, their role is fundamental, both for the prediction and measurement of the variables related to the production period (quantity and quality of crops, extension of the agricultural area used, production yields / ha, etc), to the relations with the market (agricultural prices, lack of information, transport, roads, conservation, demand …, etc), and to the impact of climate change (impact of natural disasters and adverse events on production levels).

Farmers are at the same time, *users* and *producers* of data: on the one hand, as users, they need to access up-to-date data (forecast and monitoring) for example on the analysis of demand and on atmospheric conditions, on the costs of production inputs, so to orient

[1] https://foodsystems.community/food-producers-declaration-for-the-united-nations-2021-food-systemssummit/

production choices to market conditions and to climate change. On the other hand, as data producers, they report data on production trends, costs and prices, product losses, among others. This condition places farmers not just as "stakeholders" but as "holders" of essential information for public decision-makers, also and above all in the field of food safety and nutrition.

The role of farmers' organisations and cooperatives must be considered, in ordinary market conditions as well as in crisis conditions, as *collectors* of aggregate information at local and national level, therefore promptly transmitted.

To successfully achieve food security and nutrition, agricultural organizations and cooperatives need to collaborate (e.g. share best practices, cooperate to promote sustainable food production and agricultural development in the developing countries, exchange opinions and collaborate in order to get engaged in more effective discussions and exchange of views on common concerns and activities). Also, gender equality needs to be strengthened. The role of women in agriculture as primary producers, as well as holders of environmental and traditional acknowledgments, is key to ensure food and nutrition security. In this regard, WFO calls on governments, UN and all other relevant stakeholders, to give rural women farmers the political consideration they deserve. In the context of data governance, we therefore suggest that this analysis highlights more the role of farmers, including small-scale, family farmers and women, and their organisations.

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Here below are some more specific comments on issues emerged from the analysis of the text:

- Data Ownership: data are sensitive elements that must remain property of the farmers, above all when we refer to the use of technology and AI;

- Informal economy and completeness of data: the sale of products and access to food are often connected to the informality of the transactions between supply and demand, therefore it is necessary to consider adequate methodologies of interpretation, to avoid the dispersion of information, especially in developing countries.

- In setting up trend analysis models and in the field of evaluating nutritional aspects and using indicators, the text should take more into account the UN Food Systems Summit process which, generally speaking, adopted an approach which does not promote the

existence of a universally recognised diet but rather to consider local and traditional diet models, linked to the characteristics of the territories and social ties. Therefore, models on the nutritional aspects should be connected to the different characteristics of the geographical areas and people of reference; in setting up the framework, greater consistency should be given in accordance with the indications of the FSS, in reference to traditional local diets and traditional local knowledge in rural areas.

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Finally, here below are some considerations comments in response to the questions:

1. The V0-draft introduces a conceptual framework that orders the components of the food security and nutrition ecosystem based on their proximity to people's immediate decision-making sphere, from the macro to the individual levels, and describes a four-stage data-driven decision-making cycle for food security and nutrition (FSN), from priority setting to data utilization. Use of the two is illustrated through a matrix template that facilitates the concurrent operationalization of the conceptual framework and data driven decision-making cycle to address issues relevant for FSN.

a. Do you find the proposed framework an effective conceptual device to highlight and discuss the key issues affecting data collection and analysis for FSN?

The proposed draft framework is a good basis according to WFO commitment of strengthening data and thereby espousing data driven action approach in our march towards better food security and ending malnutrition. It has a great potential to help the global community to re-examine data collection tools which further will improve data quality. The framework will help strengthen the quality and availability of data on food security and nutrition and translate them into concrete actions.

b. Do you think that this conceptual framework can indeed contribute to providing practical guidance for data collection for FSN?

Yes, indeed. Various studies explored the relationship among farmers, their operation's production data and conservation, occasionally revealing a potential disconnection between farmers and downstream supply chain organisations. Farm-level production data is said to

play a critical role in conservation and sustainability efforts for food supply chains. Responses to open-ended questions reveal downstream organisations enjoying greater financial benefits from farm-level data sharing than the farmers who provide that data, and this is a major issue that farmers consider when deciding to share their data. The framework albeit outlying the procedures should aim at adopting a farmer-driven and inclusive approach. As mentioned above, it should consider the role of farmers' associations and producers' cooperatives in ordinary market conditions and in crisis conditions, as *collectors* of aggregate information at local and national level.

c. Do you think that this four-stage data driven decision making cycle for FSN addresses the key steps in the data collection and analysis process for FSN? Where do you see the more relevant bottlenecks in the data driven decision making cycle for FSN?

Yes- Figure 2 (page 12) 4 stage data driven decision making cycle can help improving the production, analysis and use of food and agricultural data, to support collective action in this area. The four-stage data driven decision making cycle for FSN can help gauge farm characteristics and economic variables, the role of knowledge, perceptions, and attitudes as intrinsic factors toward adoption and should play a key role in farmers' decision-making process for adoption and use.

d. Can you offer suggestions for examples that would be useful to illustrate in a matrix template that facilitates the operationalization of the conceptual framework and data driving decision-making cycle to address issues relevant for FSN?

- Consider mechanisms to help filtering out low quality and misleading data
- Consider data transformation and aggregation methods
- Make provisions for the need of large amount of field data -spatial and temporal
- Work on the need to apply a guiding theory on them; difficult to include all factors of importance (variable selection)
- Prepare for training that can be computationally and timely demanding
- Availability of expert knowledge
- Cope well with data coming from a diversity of data sources (e.g. historical data from repositories with data sensed or monitored)
- The conceptual framework should emphasize the need of education on food security and nutrition and also the matrix template should highlight the issue of education taking into account local, traditional and healthier food as well the concept of diversification.
- Research should focus more on the different crops produced in the different Countries so to have a clear picture of the nutritional richness in each area and that would allow to provide a

clearer and more detailed information to people on what to eat, how to make food available and affordable. Education on food security and nutrition is a key element.

2. The report adopts the broader definition of food security, proposed by HLPE in 2020, which includes the two dimensions of agency and sustainability, alongside the traditional four of availability, access, utilization and stability.

a. Does the V0-draft cover sufficiently the implications of broadening the definition of food security for data collection, analysis and use?

Yes- We would only recommend a more farmer-driven and inclusive approach while execution of the framework is in progress.

b. What type of data will be most useful in measuring food security dimensions such as "agency" and "sustainability"?

Any possible data overlaying health, food and environment data sources to understand food systems interactions in a particular region or community. Ideally speaking there are very few data sets from which to generate the required information for groups like small-scale farmers, which tend to be isolated from global market forces. Strengthening organised agriculture, as well as engaging farmers' organisations, is key to reach the greater number possible of farmers on the ground, including small-scale and family farmers.

3. The V0-draft reviews existing FSN data collection and analysis tools, initiatives and trends.

a. Do you think that the review adequately covers the existing ones? If not, what would you add?

Yes, but we suggest it should be implemented using a more inclusive and farmer-driven approach.

b. Do you think that the trends identified are indeed the key ones in affecting data generation, analysis and use for FSN? If not, which other trends should be taken into account?

Yes, trends identified are fine. However, we need to consider that trends will also vary when it comes to complex geographies, although the ones in the framework appear sufficient. Also, the role of education should be strengthened, because it is also usually linked to the

access to information and technology, which is often a huge barrier in rural areas. Furthermore, we should work less in silos and education, nutrition and health sectors should interact more, for example, by integrating curricula at school and introducing nutrition among the subjects.

c. In particular, can you offer feedback on how digital technology, internet of things, artificial intelligence, big data, and agriculture 4.0 affect FSN? What is their likely impact in the coming decades?

One of the most prominent challenges from the farmers' perspective is providing food security for the entire society. While many farmers still rely on traditional techniques to coax a living from the land, there are opportunities to use cutting-edge technology (AI/ML/Big Data) to drive mankind towards a food-secure future. AI can be used as an enabler for farming. AI and cloud technology can be used to monitor soil, climate changes and more to make better decisions on when, where, and how much to plant on farms. Precision farming, brought about by the adoption of advanced technologies into the agricultural sector, will revolutionise food production. Using IoT technology it is observed that customers are generating 10x more annual income, experiencing a 300% increase in crop yields, and saving on an average 17 hours of manually moving water per week. The massive rise of Big Data generated from smartphones, social media, Internet of Things (IoT), and multimedia, has produced an overwhelming flow of data in either structured or unstructured format. Big Data technologies are being developed and implemented in the food supply chain that gather and analyse these data. Such technologies demand new approaches in data collection, storage, processing and knowledge extraction. Big Data analysis is used to provide predictive insights in several steps in the food supply chain, support supply chain actors in taking real time decisions, and design the monitoring and sampling strategies. However, technologies and data imply considerations regarding the affordability and utilisation of those technologies by all farmers and what kind of support farmers need to use them in the most effective way, according to their needs and skills.

4. The report discusses capacity constraints at local, national and global levels, with a special focus on statistical and analytical capacity.

a. Do you think that the V0-draft covers all the issues – and their consequences - of capacity constraints at the different levels? YES

5. The V0-draft discusses the role of new and emerging technologies in data collection and analysis tools for FSN.

a. Do you think that the presentation of new and emerging technologies captures the main trends? What other new and emerging technologies could be discussed in the report? YES

b. In what other ways can new and emerging technologies be relevant to each of the stages/aspects of the FSN data value chain/data lifecycle (i.e., Define evidence priorities and questions; Review, consolidate, collect, curate and analyze data; Translate and disseminate results and conclusions; Engage and use results and conclusions to make decisions)?

Digitalization and the use of new technologies and alternative data sources, such as satellite imagery and citizen-generated data, are accelerating collaboration on agri-food systems. However, lack of investment in national data and statistics systems is hindering developing countries like India, among others, from harnessing this potential. Donors are facing challenges in financing agricultural data and statistics as historic investments have been ineffective and unsustainable. Effective collaboration is fundamental for the modernization of statistical production and for enhancing trust and legitimacy of data and statistics in the food and agriculture sector. When stakeholders along the data value chain collaborate, the result is more and better data produced, more relevant and timely insights for decision-makers, and better use of the available resources, as well as enhanced digitalization. This requires inclusive and multi-stakeholder approaches that can enhance trust and support data governance and sharing. FAO can play a vital role in this area, also through its liaison offices and involving for example farmers' organisations on the ground, although it is not always easy to face challenges linked to financing and effectiveness of this kind of data and statistical work and country level support.

c. In what other ways can new and emerging technologies be relevant to each of the FSN dimensions (i.e., Availability; Access; Utilization; Stability; Agency; Sustainability)?

In multiple ways. New emerging technologies would help improve the efficiency and help follow an integrate approach for each of the FSN dimension.

d. What are some of the issues with respect to ethical use of data, access, agency and ownership linked to these new and emerging technologies that should be further discussed in the report?

Agricultural Big Data is also vulnerable to privacy and security threats. Accuracy and availability of data proved to be an issue because not all farmers had available data and data retrieved from third parties may not be accurate.

6. The report reviews issues concerning institutions and governance for data collection, analysis and use, with a focus on data governance principles, data protection, transparency and governance of official statistics, the implications for governance of an increasingly digitalized world, and examples of initiatives addressing governance challenges.

a. Are there any issues concerning governance of data for FSN that have not been sufficiently covered in the draft report?

Not really. Almost much of the important and relevant ones are covered. We could make it more compatible to tackle the above-mentioned challenges.

b. What are some of the risks inherent in data-driven technologies for FSN? How can these risks be mitigated? What are some of the issues related to data privacy, access and control that should be carefully considered?

Agricultural Big Data is also vulnerable to privacy and security threats. A more cohesive, farmer driven policy-making mechanism to craft policies which makes geographies immune to the above risks. Taking governmental support or implementing policies through agricultural ministries will also be a viable option.

c. What are the minimum requirements of an efficient FSN data system and how should these be prioritized?

Data System has the potential to solve development problems cheaper, faster and more effectively which would be the minimum requirements of an efficient FSN Data system. From food insecurity and malnutrition to climate change and environmental degradation, an effective FSN data system should play a role in help accelerating the development of robust responses to some of the most pressing challenges of our time. It should ideally transform the world of genomics and crop breeding, and revolutionizing disciplines from climate modelling to agronomy. It should help refine policies and improve lives. Remote sensed and effective FSN data systems are transforming approaches to the development of more resilient food systems. All above will assume equal priority.

d. Which mechanism or organization should ensure good governance of data and information systems for FSN? How to regulate and mitigate potential conflicts between public and private ownership of data?

While data collection and processing now underpin many health, education and social services used for and by farmers, this digital ecosystem is so complex and data processing so seamless that neither the producers nor their affiliate organisations are fully aware of how their data are being captured and used – and thus, the potential benefits and risks. The good governance of farmers' data raises issues beyond data protection, including the validity of applying concepts such as use of farmer's data for marketing purposes and surveillance by state actors, risks of group data profiling and the right to have data erased or forgotten.

e. What are the financing needs and the financial mechanisms and tools that should be established to allow all countries to collect, analyse and use FSN data?

Every Data Collection program to collect, analyse and use FSN data needs adequate funding to translate it into reality. Thus, the financing needs are grave and pressing for any program see daylights. Forming strategic groups to work towards catalysing investments and partnerships for high scale, sustainable FSN programmes would be an effective financial mechanism. FAO and other UN agencies, farmers' organisations, together with other stakeholders at local level could strengthen collaboration towards mobilising partnerships for FSN and help rise joint investments to boost sustainable development. This brings the nutrition community alongside the private sector, governments and philanthropists who help deliver innovative solutions and national nutrition programmes at scale, which should always engage farmers and their organisations.

7. Drawing on HLPE reports and analysis in the wider literature, in the next draft the report will outline examples of potential policy pathways to address challenges to data collection and analysis tools for FSN.

a. What data do the global community and international organizations need in order to gain an appropriate insight into the current state of world food security and to agree on and design international action to improve it?

Please refer to the above answers. Due to the diversified nature in which geographies behave data cannot be restricted to "what data". Data has to be made available from anything and everything to enable effective decision-making in complicated geographies and otherwise.

b. What data do countries need for more effective decision-making for food security and nutrition and to inform policies for the transformation of food systems?

Some examples:

- Adoption of emerging technologies and smart techniques.
- Adequate investments.
- New resources for researchers – expanding existing knowledge and filling critical gaps
- An evolving Ethical Framework for data collection
- Research – aligned with real-world nutritional & food security needs