



Open Data for Nutrition: A Strategy

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Key messages

- > Open data has the potential to improve nutrition-based research by effectively increasing the ability to access and use a greater range of data on the part of actors from a wide range of sectors.
- > This calls for focus on a *food systems* approach that can help link agriculture and nutrition outcomes. All the elements and activities that relate to the production, processing, distribution, preparation and consumption of food can be drawn together to deliver impact.
- > At the heart of a new open data policy for nutrition is a consensus statement or charter that research funders can publicly sign up to, providing a tangible commitment that can be shared with all stakeholders.

Overview

Global Open Data for Agriculture and Nutrition (GODAN) and the Need for Nutrition Education/Innovation Programme (NNEdPro) are developing a Nutrition Open Data Strategy. This strategy aims to provide a method of gaining agreement across organizations that collect and generate nutrition data across the entire food system, with a view to making this data available and openly accessible to other researchers and practitioners.

The maximization of data availability to nutrition and agriculture practitioners, drawn from a variety of audiences and sec-

tors, will help towards achieving the United Nations Sustainable Development Goals (SDGs), improving food security and nutritional health and wellbeing.

A workstream needs to be undertaken to develop a strategy that will provide clear guidance to producers and users on what open data practices should be followed. This will underpin the production of a consensus statement, or charter, that publicly commits organizations and researchers to share their data openly. Work needs to be undertaken on developing a common vocabulary, while stakeholder opinion and the challenges and opportunities need to be fully identified.

A working group will develop the strategy for consultation, ahead of developing a consensus statement or charter for organizations and researchers to sign up to.

“This strategy aims to provide a method of gaining agreement across organizations that collect and generate nutrition data across the entire food system”

The need for an Open Data Strategy

The Food and Agriculture Organization of the United Nations (FAO) estimated that between 2011 and 2013 one in eight people in the world suffered from chronic hunger. At the same time, the percentage of the population who were undernourished had decreased by 17% compared with 1990–92.¹ The changing nutrition landscape has led to a shift in diet-related epidemiology, which has been primarily characterized by the coexistence of undernutrition with overweight and obesity, also known as the double burden of malnutrition. Achieving food and nutrition security and addressing the double burden of malnutrition have been identified in the UN SDGs.²

In terms of agriculture, the sector is under pressure to provide food to meet the needs of a growing population while facing issues such as the degradation of fertile land, the drying up of water resources, the disappearance of genetic resources and climate variability. These, in turn, will have an effect on the nu-



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Environment concept 'Green Planet'

trient content of the food grown. Price volatility also has a disruptive effect, particularly on vulnerable populations.

With increased amounts of data collected across the food value chain, open data offers the potential to improve food production, nutrition and the delivery of information to users. Open data will not of itself replace expertise in the sphere of nutrition; however, ensuring the data is produced in a manner that is understandable and accessible will empower decision-makers, entrepreneurs, health professionals and consumers to make better choices along the chain. Apps and related technological platforms will need to be put in place to ensure cross-sector actors are able to access the tools they need to enable them to make better decisions.

The Global Nutrition Report 2018³ identified the main issues with regard to nutrition, confirming that the absence of accessible and usable data remains a fundamental barrier to improving nutrition.

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Collective aim

The GODAN–NEdPro Nutrition Open Data Strategy aims to be a game-changer, creating the necessary environment for organizations that collect and produce nutrition data to make data openly available and accessible to other organizations and researchers. Maximizing the availability of data will be useful to nutrition and agriculture practitioners working to achieve the UN goal of ending hunger and all forms of malnutrition by 2030.

The strategy development partners

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The two partners involved in the development of this strategy provide distinct yet complementary skill sets in the field of open data for nutrition to the project.

GODAN (Global Open Data for Agriculture and Nutrition)

By supporting global efforts to make agricultural and nutritionally relevant data available, accessible and usable for unrestricted use worldwide, GODAN is helping to deal with the urgent challenge of global food security. It is a rapidly growing network, comprising more than 900 partners from national governments as well as nongovernmental,

international and private-sector organizations that have committed to this joint statement of purpose.⁴

The initiative focuses on building high-level support among governments, policymakers, international organizations and businesses. GODAN promotes collaboration to harness the growing volume of data generated by new technologies, to solve long-standing problems and to benefit farmers and the health of consumers.

NNEdPro (Need for Nutrition Education Project)

NNEdPro is a think-tank, academy and knowledge network. Its mission is to develop a critical mass of knowledge, skills and capacity in nutrition and health, within the healthcare and public health workforce, resulting in improved health practices and outcomes.

The project has evolved to become the Global Centre for Nutrition and Health, focusing on developing adaptable and scalable models for medical nutrition education, combining clinical and public health knowledge with leadership training to aid implementation in healthcare settings.



André Laperrière, Executive Director of GODAN



The role of nutrition in achieving the UN Sustainable Development Goals (SDGs)

Both GODAN and NNEdPro are interested in the ability of data to improve human health, and believe the best way to achieve this is through open data. However, more research needs to be undertaken into successful interventions to fully understand how open data can best support progress.

Nutrition underpins all of the UN SDGs, and both organizations involved in the strategy believe that a practical food systems approach will deliver concrete and practical global nutrition outcomes (**Table 1**).

“Partnerships are key to improving nutrition”

Food security as a component of nutrition security

When we talk about feeding the planet, and our ability to adequately feed an estimated 9.7 billion people by 2030, we often discuss agricultural production as the means to achieve food security. Yet, 2 billion people consume excess calories – often in the form of energy-dense food – while consuming a diet that may contain either a deficiency or an excess of specific dietary components, thereby failing to meet their nutrient needs.

At the 1996 FAO World Food Summit, food security was defined in the following terms:

“Food security exists when all people, at all times, have physical, economic and social access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.”

The focus on the word ‘sufficient’ implies that humans have the right amount of food, which can be interpreted as having neither too little, nor too much. From a nutrition standpoint, the International Food Policy Research Institute (IFPRI) described the food security crisis by placing the food-insecure population into three broad categories: **(1)** too many calories, and for many, not enough nutrients; **(2)** sufficient calories, not enough nutrients; and **(3)** too few calories, not enough nutrients. IFPRI has termed these factors the ‘triple burden of malnutrition’.⁵ It is clear to see from these three categories that food security is not simply an issue of calories, but also one of nutrients and diet quality.

However, ‘nutrition security’ also requires nonfood factors, such as clean water and a safe environment, so one can consider a hierarchy: nutrients contribute to food security; and food security contributes to nutrition security.⁶

GODAN has aligned its efforts with SDG sub-goal 2.1,⁷ to “end hunger and ensure access by all people, in particular the poor and people in vulnerable situations including infants, to safe, nutritious and sufficient food all year round,” linking to the 1996 FAO World Food Summit term of “sufficient”.

A food systems approach

Agricultural systems are under pressure to provide adequate nutritious food while coping with depleted water resources, the degra-

TABLE 1: Nutrition link to the Sustainable Development Goals from the SUN Movement Report

Sustainable Development Goals	Nutrition link from the SUN Movement Report ⁵
01 No Poverty	Being poor limits the ability of individuals to access adequate food.
02 Zero Hunger	Agriculture and food security are cornerstones of nutrition, and good nutrition supports productive lives.
03 Good Health and Wellbeing	Up to 45% of deaths in children under 5 are caused by undernutrition.
04 Quality Education	Learning and focusing in school is difficult without a sufficient diet, as good nutrition drives up IQ levels.
05 Gender Equality	When women control the family income, children's health and nutrition improve at a greater rate.
06 Clean Water and Sanitation	Access to safe water and sanitation is an absolute prerequisite for nutrition, with 50% of malnutrition linked to poor sanitation.
07 Affordable and Clean Energy	Essential for producing food and thus nutrition.
08 Decent Work and Economic Growth	0.9% of GDP is lost to iron deficiency alone. High levels of malnutrition in some countries may result in 11% loss to GDP.
09 Industry, Innovation and Infrastructure	Essential for innovations to improve nutrition.
10 Reduced Inequalities	Almost 50% of countries experience malnutrition.
11 Sustainable Cities and Communities	Malnutrition is widespread in slums and shanty towns.
12 Responsible Consumption and Production	Tackling resource use and degradation is key to sharing resources, improving access to quality food and stabilizing food prices.
13 Climate Action	Climate change may reduce food production and cause water scarcity. Seasonal effects also influence nutritional status.
14 Life Below Water	Healthy dietary choices can be good for the planet and nutritional intake.
15 Life on Land	Soil degradation threatens our ability to grow food, and sustainable food production can improve nutrition.
16 Peace, Justice and Strong Institutions	War and conflict are major underlying factors of nutrition insecurity. Ending malnutrition supports stable societies.
17 Partnerships for the Goals	Aid allocated to nutrition has high returns. A US\$1 investment in nutrition has demonstrated a US\$16 return in economic growth. Partnerships are key to improving nutrition.

Source: 2016 SUN Movement Annual Progress Report

dation of fertile land and climate variability among other issues, all of which have an effect on the nutrient content of the food grown. The context is different in every country, and data needs to be collected at national and subnational levels to understand and monitor the situation within the relevant country and compare across countries. This data needs to be made available so that it can be widely utilized, particularly in cross-country comparisons.

One of GODAN's core goals is to tie agriculture to human nutrition through the effective use of data interoperability and integration. A *food systems* approach is a well-researched method to support the link between agriculture and nutrition outcomes. It includes all the elements (environment, people, inputs, processes, infrastructures and institutions) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the output of these activities, including socioeconomic and environmental outcomes.⁸ (The *food supply chain* is a component of the food system, consisting only of the activities and actors that take food from production to consumption and to the disposal of its waste).⁹

In adopting a food systems approach, the open data nutrition strategy links to the three pillars of sustainability – economic, environmental and social – in relation to value chain



A farmer using tablet computer analysis data in a field under cultivation

activities. This is required because a simple drive to increase nutrients could produce adverse consequences, such as further soil erosion, increased environmental damage or reliance on limited and harmful diets. Therefore the strategy must encourage wider aspects of research, reflecting the entire production, manufacturing and distribution processes involved in the delivery of better diets.

Open data in the food system is essential for effective decision-making and resource efficiency. A food systems approach, underpinned with high-quality open data, provides greater understanding of all the factors involved.

GODAN–NNEdPro Open Data Strategy

The project aims to bring together partners to determine:

- 1) types of data being produced and used;
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- 2) opportunities and challenges involved in making data openly available;
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- 3) development of standard guidelines for open data; and
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- 4) development of an Open Data Strategy Charter to encourage partner involvement.

Open data

Open data is data that anyone can access, use or share.¹⁰ Such access to data can help shape solutions by enabling effective decision-making while driving organizational transparency. A strong data infrastructure requires that different datasets can communicate with each other, and adherence to common open data standards can help. A data standard is a guideline or series of guidelines that defines the way in which data should be collected or structured. By following the standard, similar data can be easily compared over time, across locations and within and between organizations, as well as being easily manipulated to help identify trends. In other words, standards simplify data reuse.

Regarding the proposed project, the data strategy and consensus statement or charter needs to engage stakeholders within the agriculture and nutrition research, funding and practitioner communities.

Project results and analysis

Spectrum of nutrition data

In preparation for a workable approach, a systematic review of the keywords used to describe the food system across the spectrum of nutrition was undertaken. It covered sectors including agricultural production, processing, storing, transportation, retailing and consuming, taking into consid-

eration the psychosocial context in which food is considered and valued.

Stakeholder engagement

During the 2017 NNEdPro International Summit on Medical Nutrition Education and Research, presentations were provided on the wider determinants of health outcomes. This included such assertions as the need for policymakers to be able to recognize that access to open data can support policy decisions in agriculture, and the potential for food systems to bridge the gap between food production and nutrition.

Participants observed that there was a strong case for an intersectoral approach. Determinants – including heredity, environmental and other nondietary aspects of lifestyle such as socioeconomic factors – impact dietary choices. The ability to plan intervention pathways was also a factor. Manufacturers need to alter food production and to provide better nutrition education.

Discussion of project findings

The work undertaken so far has determined the following foundational factors for an open data nutrition strategy:

> Challenges to opening, using and reusing data

Open data can lead to the potential increase in the use of data. However, the data is not always being used for the purpose it was originally intended, which can adversely affect interpretations.

> Repositories

Existing open data repositories can be better publicized, ensuring that potential users are aware of the existence and availability of such data sources (see examples in **Table 2**).

> Timely and accessible

Data needs to be made open as a priority as soon as possible after reports or scientific publications are completed, to ensure timeliness of availability.

> Discoverable

Users need to be able to find relevant data. Potential users could be informed of the existence or release of the data. Recording studies in a repository enables researchers to be aware of the existence of other studies being undertaken.

> Interoperable

Interoperability is the ability of systems and services that create, exchange and use data to have clear, shared vision for the contents, context and meaning of that data. One-off approaches to data are likely to have hidden costs and thus further impact on the usability.

TABLE 2: Examples of data repositories and registries

Registry	Study types	Cost
ISRCTN registry ¹¹	All clinical research studies	GBP 226 (+VAT, when applicable)
ClinicalTrials.gov ¹²	Clinical trials and observational studies assessing biomedical and/or health outcomes	Free
AgTrials ¹³	Trials, mainly of plant varieties, but includes agricultural technology for farmers in the developing world	Unknown – appears free
Agricultural Data Collection ¹⁴	Farmer-centric data repository	US\$24.95 per month

> Comprehensive

Data needs to be published in a way that makes it easy to find and easy to understand what it contains. It should be accompanied by supporting information about how the data is collected and what it can be, or has been, used for.

> Data ownership, acknowledgement and protection

Open data creates challenges around data ownership, particularly of personal data, while at the same time opening research opportunities and driving commercial use. The terms of reuse, including citations of the data, should be clear.

> Data protection and ethical considerations

Research data is collected and processed after a process of ethical approval. Any use of data should adhere to the ethical standards and approvals granted for the original study.

The process of informed consent needs to be considered so as to ensure that the data can be made openly available within the constraints of what the owner consented to.

> Confidentiality

In order to maintain confidentiality, all data will be anonymized before making it open, with a mechanism to report any identified issues to the primary data holder. However, as anonymization can be resource-intensive, an efficient way to manage and accomplish this needs to be identified.

> Data quality

Data and its quality can vary by organization. The gaps in data will need to be clearly articulated, and consideration should be given to developing a feedback mechanism with a view to improving the quality of data.

> Data maintaining

When data is opened, it should be made clear whether it is a one-off project or whether the data collection is done on a continual basis. If data continues to be collected, a planned timeline of when the datasets will be updated should be provided.

> Data collection with intent to open

If funding depends on open data, are there ways of finding out how to make open data work? How much would practice change if research and project funders required data to be open? Seeking commitment from funders to make this a component of funding agreements could significantly advance their particular area of work and the availability of data.

> Standards and metadata

Questions remain as to which standards should be used. As the real value is in the metadata, guidance should be provided to all parties on what metadata to include and on how to do this, particularly for those performing small-scale research.

Next steps in development and implementation

Creation of a GODAN–NNEdPro

Open Data Nutrition Working Group

GODAN led a Nutrition Data Gaps Working Group in 2016, which resulted in the release of the Branded Food Products Database¹⁵ at the 2016 GODAN Summit¹⁶ in New York City. Capitalizing on this experience, GODAN will form a Working Group to develop a Nutrition Open Data Strategy. This Working Group, which will cover the entire nutrition spectrum, will include representatives from governments, universities, NGOs and the private sector.

Terms of reference

Membership is proposed to consist of delegates from the following groups:

- > the nutrition and agriculture research communities;
- > policymakers from the fields of public health, international health development, agriculture and sustainability;
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- > information technology, artificial intelligence and data systems architecture experts, researchers and private-sector representatives;
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- > funding bodies;
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- > end users;
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- > intersectoral representation from industry, government, academia and the not-for-profit sector; and

- > journals and publishers.

The Working Group will act in an advisory capacity to assist a project team to create a strategy and consensus statement or charter that will be both ambitious and realistically implementable.

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“The goal must be achievable and realistic, but also beneficial to all parties, in order to obtain agreement”

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Open Data Consensus Statement / Charter

Developing a consensus statement, or charter, that partners and research funders can publicly sign up to is a means of gaining tangible agreement and commitment among all stakeholders, researchers and practitioners.

The goal must be achievable and realistic, but also beneficial to all parties, in order to obtain agreement. Using the information already collected and input from the Working Group, the consensus statement or charter and its supporting strategy must contain clear guidance. In addition to consensus on the principles of open data-sharing, there needs to be agreement concerning a potential multilevel support and capacity-building solution along the broad outlines proposed by GODAN and NNEdPro.

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