


# BMJ Open An in-depth review of the UNICEF NutriDash platform, lessons learnt and future perspectives: a mixed-methods study

Bethan Swift <sup>1,2</sup>, Annette Imohe,<sup>3</sup> Cristina H Perez,<sup>3</sup> Louise Mwirigi<sup>3</sup>

**To cite:** Swift B, Imohe A, Perez CH, *et al.* An in-depth review of the UNICEF NutriDash platform, lessons learnt and future perspectives: a mixed-methods study. *BMJ Open* 2023;**13**:e062684. doi:10.1136/bmjopen-2022-062684

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2022-062684>).

Received 21 March 2022  
Accepted 06 December 2022



© Author(s) (or their employer(s)) 2023. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

<sup>1</sup>Nuffield Department of Women's and Reproductive Health, University of Oxford, Oxford, UK

<sup>2</sup>Wellcome Trust Centre for Human Genetics, Oxford, UK

<sup>3</sup>Nutrition Section, UNICEF, New York, New York, USA

## Correspondence to

Bethan Swift;  
bethan.swift@wrh.ox.ac.uk

## ABSTRACT

**Objectives** Robust data on nutrition are essential to realise the right to nutrition for every child. Created in 2009, UNICEF's Nutrition Dashboard (NutriDash) collects nutrition programme information from 125 countries. An in-depth review of NutriDash was conducted to understand its strengths and identify key actions to increase its effectiveness and efficiency.

**Methods** Adapting the Centres for Disease Control and Prevention updated guidelines for evaluating public health surveillance systems, a mixed-methods approach was used. A questionnaire was designed to capture information on key attributes of NutriDash and disseminated to UNICEF country offices for quantitative feedback on user experiences. Structured key informant interviews were held with internal and external stakeholders to gain qualitative perceptions on data generated from NutriDash. Analysis involved producing frequency distributions for the questionnaire data and performing thematic analyses on interview data.

**Results** A total of 53 respondents completed the questionnaire (42% response rate), representing 48 countries and good regional geographic representation. Most respondents (96%) worked in UNICEF country offices. The percentages of participants who agreed or strongly agreed with each attribute of the NutriDash system were as follows: acceptability: 71%, stability: 68%, simplicity: 63%, data quality: 60%, flexibility: 58% and usefulness: 43%. Internal and external stakeholders commented on the value of NutriDash; its use ranging from nutrition global trend monitoring for programme planning to producing reports and dashboards. Key themes derived from this review as areas for improvement included communication, access to data and data quality.

**Conclusions** This review has identified key themes that will inform improvements to NutriDash and form a baseline for future periodic reviews to continuously enhance the system to improve availability of timely quality nutrition programme data. UNICEF will continue to engage with countries, key partners and governments to improve the NutriDash data value chain and ensure the right to nutrition for every child.

## INTRODUCTION

Globally, substantial progress has been made in reducing poverty and food insecurity over

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ We adapted already established methods of evaluating information systems to assess the following attributes: acceptability, stability, simplicity, data quality, flexibility, usefulness and representativeness.
- ⇒ The system was evaluated using quantitative and qualitative methods and used multiple sources to collect evidence.
- ⇒ Feedback was gained from those who enter their data into NutriDash and from people who use the data, which included both internal and external stakeholders.
- ⇒ Although responses were received from a broad range of countries and all world regions were represented, a 100% response rate was not achieved.

the past 50 years, however, the prevalence of maternal and child malnutrition across the globe still remains unacceptably high,<sup>1 2</sup> with many countries facing a double or triple burden of malnutrition.<sup>3</sup> Around 45% of deaths among children under 5-years-of-age are linked to undernutrition.<sup>4</sup> Globally in 2021, an estimated 149.2million children were affected by stunting, 45.4million suffered from wasting and 38.9million were overweight or obese.<sup>5</sup> In addition, the impact of the COVID-19 pandemic on health systems, household food insecurity and economic growth, has threatened the progress made in this field.<sup>6</sup> Prevention of all forms of malnutrition is critical to ensuring children's growth, cognitive development and future learning potential<sup>7</sup>—and with the endorsement of the Sustainable Development Goals (SDGs) in 2015, ending hunger and malnutrition by 2030 is now a collective global commitment.<sup>8</sup> The *United Nations Children's Fund's (UNICEF) Nutrition Strategy 2020–2030: Nutrition, for Every Child*, sets forth the organisation's vision, goals and priorities to support governments and partners, in scaling up policies,

Protected by copyright: including for uses related to text and data mining, AI training, and similar technologies.

BMJ Open: first published as 10.1136/bmjopen-2022-062684 on 30 January 2023. Downloaded from <http://bmjopen.bmj.com/> on May 1, 2026 at University of Oxford - Bodleian Health Care Libraries



strategies and programmes to end child malnutrition in both development and humanitarian settings.<sup>9</sup>

Timely data on the coverage, quality, scale and outcomes of nutrition programmes are necessary to realise the right to nutrition for every child. It is important to know how many children are benefiting from evidence-based interventions, and to understand the gaps and disparities to improve coverage, quality and equity.<sup>7</sup> The 2014 Global Nutrition Report (GNR)<sup>10</sup> called for continued investment in data to support a 'nutrition data revolution', and in 2018, the GNR reinforced the call for investment in more and better data to inform actions across sectors and hold stakeholders accountable to nutrition commitments.<sup>11</sup>

Quality routine data on the coverage and progress of programmes are critical to inform programme improvements—but these data have not always been systematically and holistically captured and/or collated at country, regional or global levels. Created in 2009 by UNICEF's Nutrition Section in headquarters, the Nutrition Dashboard (NutriDash)<sup>12</sup> responds to this critical data and information gap by collecting nutrition programme information from 125 countries. Through the NutriDash platform, UNICEF supports countries in collecting, analysing and sharing the latest nutrition programme data on maternal and child nutrition. The data are used for advocacy to improve global and national policies strategies and programmes as well as serving as surveillance for coverage of nutrition-specific programmes and to help track accountability of government and agency commitments and investments.

Nutrition programme data are collected on an annual basis by UNICEF country offices, governments and partners. The information collected covers all nutrition programmes supported by UNICEF, as well as those delivered by national governments and other partners. Annually, NutriDash also gathers data on nutrition supply requirements to support the global planning and procurement of nutrition supplies. The programme coverage data and the forecasted needs provide critical information to inform global programme planning and implementation. For instance, in 2020, an estimated 441 million vitamin A capsules were donated to 53 countries through the contribution-in-kind programme in partnership with Nutrition International. Consequently, UNICEF reached an estimated 176 million children with two doses of vitamin A supplementation.

To ensure that the data and information generated through nutrition information systems are accurate and of good quality, periodic assessments are necessary to improve the overall efficiencies of the data value chain. Therefore, the aims of this study were to (1) describe the NutriDash system; (2) assess the attributes of NutriDash and (3) gain an insight into what works well with the system and identify key actions to increase the effectiveness, efficiency, quality and accuracy of nutrition programme data.

## METHODS

The study team comprised one external researcher (BS) and three members of the Nutrition section at UNICEF (AI, CHPG and LM).

The team adapted the Centres for Disease Control and Prevention's (CDC) Updated Guidance on Evaluating Public Health Surveillance Systems,<sup>13</sup> which includes six steps: (1) identify and engage stakeholders in the evaluation; (2) describe the system; (3) focus the evaluation design; (4) gather credible evidence regarding the performance of the system; (5) justify and state conclusions and make recommendations and (6) share lessons learnt from the evaluation.

### Identifying and engaging stakeholders

Stakeholders were identified and categorised into two groups: (1) those who provide and upload data onto the NutriDash platform and (2) those who use the data generated from NutriDash. Those who provide and upload data in NutriDash were mainly UNICEF staff and/or employees of governmental health departments, whereas those who use the data generated from NutriDash included both UNICEF staff, government and external partners. The team engaged with stakeholders by email to either disseminate the questionnaire or invite them to take part in an interview.

### Describing the system

A review of the NutriDash system involved obtaining information on how the system works, the timeline of the system, its purpose, support provided through the process and how the data are used. This information was obtained in August 2021 from members of the UNICEF headquarters' NutriDash core team.

### Focusing the design of the review

Since the CDC guidance focuses on evaluation of a public health surveillance system, the team adapted the guidance to suit the needs of this review. The guidance recommends evaluating 10 surveillance attributes, of which seven were relevant for this review: representativeness, acceptability, stability, simplicity, data quality, flexibility and usefulness. These attributes have been described in detail elsewhere.<sup>13</sup> All attributes, apart from representativeness, were assessed using a questionnaire sent to NutriDash users. Representativeness was assessed by the NutriDash core team at UNICEF HQ by examining the number of countries reporting to NutriDash and assessing trends and completion rates of modules over time. Views on how data from NutriDash are used in the wider spectrum were assessed through interviews.

### Gathering credible evidence

An online questionnaire was created (online supplemental file 1) based on the attributes stated in the CDC's guidelines<sup>13</sup> and administered to UNICEF and government staff responsible for entering data into NutriDash from 125 countries to assess the attributes described above, including the respondent's organisation and

country. The questions were formulated on a five-point Likert scale<sup>14</sup> ranging from 'strongly agree' to 'strongly disagree', with an additional 'not applicable' to avoid fence-sitting among respondents who otherwise may have chosen an indifferent response. For each attribute, open-ended comments were collected to enable respondents to provide other feedback. Data were collected for 10 days in August 2021, with reminder emails sent on two occasions to increase the response rate.

Five UNICEF partners who have used NutriDash data and four UNICEF staff members who lead on UNICEF's key nutrition result areas were identified as key users of the NutriDash data and were invited to participate in a structured key informant interview. Each interview was conducted online and lasted for approximately 15 min. Participants were given the interview questions in advance to have time to formulate their answers and give feedback efficiently (online supplemental file 2).

### Data analysis and making conclusions

A mixed-methods approach was used. To analyse the questionnaire data, frequency distributions for each question on the Likert scale were analysed to determine the overall perceptions of NutriDash users. Qualitative summaries from the questionnaire are reported in the text. The total number of respondents for each attribute were calculated as those who answered one of the following: strongly agree, agree, neither agree nor disagree, strongly disagree or disagree on the Likert scale questions. Data from participants who answered 'N/A' were treated as missing data during the analysis under the assumption that this was from a random sample whose opinion would not change the outcome of the study. The proportion of participants who 'agreed' or 'strongly agreed' with each of the statements was assessed and is presented as an aggregated measure for each attribute. If the score was  $\geq 50\%$ , the attribute was interpreted as being sufficiently met. A varying number of questions were asked for each of the attributes, which directly influences the likelihood of achieving the  $\geq 50\%$  threshold.

One author (BS) conducted the interviews with stakeholders and audiorecorded, transcribed and coded them for themes.<sup>15</sup> Themes were derived by examining the transcript on three separate occasions and performing content analysis to categorise themes and actions raised by interviewees. Categories were derived inductively.<sup>16</sup>

### Patient and public involvement statement

Patients and/or the public were not involved in this study.

## RESULTS

### Description of NutriDash

NutriDash is a global UNICEF online data capture and reporting platform for nutrition programme information from both UNICEF and non-UNICEF supported programmes. The platform captures country level nutrition programme data for 125 countries. It captures,

stores, analyses and visualises comprehensive information on key nutrition-specific interventions and performance over time at individual country, regional and global levels. When established in 2009, NutriDash was a simple excel file collecting data from limited countries and nutrition programmes; over time, the system has moved to an online platform. NutriDash has also evolved to be used for institutional reporting, where only key indicators are collected. This lighter version of NutriDash is referred to as NutriDash Lite. The NutriDash platform consists of a data capture side in the form of questionnaires, arranged by modules (table 1) on key nutrition programme areas, and a reporting side that displays the analysed programme data through dashboards for country-level, regional-level and global-level data. NutriDash captures data relevant to nutrition programmes as outlined in UNICEF's Nutrition Strategy 2020–2030,<sup>9</sup> including (1) early childhood nutrition; (2) nutrition in middle childhood and adolescence; (3) maternal nutrition; (4) nutrition and care for children with wasting; (5) maternal and child nutrition in humanitarian action and 6) partnerships and governance for nutrition.

NutriDash aims to provide a repository of nutrition programme data and information, both for UNICEF programmes, and as a global public good—providing quality, up-to-date data and information on the status of nutrition programmes. Several knowledge products are produced to communicate NutriDash results, such as dashboards, annual reports and webinars and UNICEF global nutrition databases.<sup>17</sup> The data also feed into partner products, such as the Global Breastfeeding Scorecard.<sup>18</sup>

Individuals who have been authorised by Nutrition Section at UNICEF can enter NutriDash and access the data. The specifics of data available to them will vary depending on what they have been authorised to access. Raw data are not available to the public, only by request.

### Study sample

A total of 53 respondents completed the questionnaire representing 48 countries, with good representation from all UNICEF regions (online supplemental figure 1). The overall response rate was 42% (48/114) and the majority of respondents (96%, n=51) worked directly for UNICEF country offices, while the remaining two worked in governmental health departments (2%, n=2).

### Attributes of NutriDash

Table 2 includes definitions for each attribute, as well as the percentage of strongly agree or agree responses that were selected by participants in each attribute: acceptability: 71% (146/206); stability: 68% (68/100); simplicity: 63% (268/424); data quality: 60% (211/350), flexibility: 58% (60/104) and usefulness: 43% (153/352).

### Acceptability

Four out of five respondents (79%) strongly agreed or agreed that their contributions and inputs to the existing

**Table 1** List and description of modules collected in NutriDash

Module	Information gathered
General information	Overview of nutrition interventions, policies, strategies or plans of action available in country; government and UNICEF funding for nutrition interventions and requests for assistance with supply or procurement services for nutrition commodities.
Early Childhood Nutrition	Programme design, performance and supply needs for breastfeeding, complementary feeding, home fortification with micronutrient powders, vitamin A supplementation and deworming.
Nutrition of School Age Children, Adolescents and Women	Overview of the enabling environment for adolescent and school nutrition; implementation of nutrition components in programming for school-aged children and coverage of existing school nutrition programmes.
Maternal Nutrition	Status of antenatal care policy; human resources for maternal nutrition and supply for quality maternal nutrition care.
Large-Scale Food Fortification	Legislation, monitoring and quality control for large-scale food fortification, including salt iodisation and wheat flour and edible oil fortification.
Care for Children with wasting	Design, coverage, performance and supply needs for programmes to screen for and treat children with wasting.
Maternal and Child Nutrition in Humanitarian Contexts	Assessment on ongoing country responses to humanitarian crises and coverage of nutrition programmes in emergency settings.
Governance, Coordination and Systems	National policies, financing and monitoring plans for nutrition; nutrition representation in policies, programmes and monitoring across food, health, social protection and water, sanitation and hygiene systems; nutrition indicators in health management information systems and nutrition monitoring and evaluation tools utilised in-country.
Supply Forecasting for Care for Children with wasting	Estimated supply needs for the following calendar year.
Supply Forecasting for Micronutrient Powders	Estimated supply needs for the following calendar year.
Supply Forecasting for Vitamin A Supplements	Estimated supply needs for the following calendar year.
Supply Forecasting for Deworming	Estimated supply needs for the following calendar year.

NutriDash platform were considered valuable, and a similar proportion (76%) strongly agreed or agreed that they received adequate support in completing the NutriDash modules. Almost three-quarters (73%) of respondents strongly agreed or agreed that NutriDash was important and contributed to enhancing nutrition programmes. There were some concerns surrounding data privacy and confidentiality, with just over half (55%) of respondents agreeing that these were protected by the NutriDash platform (figure 1A).

### Stability

Respondents strongly agreed or agreed that the existing NutriDash platform was reliable when reporting nutrition data (71%) and that any arising problems were addressed with minimal delays (65%) (figure 1B).

The HQ team has a quality assurance system and provides timely feedback. The regional office also provides assistance as needed.

### Simplicity

Over half (58%) of respondents agreed or strongly agreed that reporting within the NutriDash platform was easy and 64% of respondents agreed or strongly

agreed that the modules for reporting nutrition data were easy to complete. Many respondents (77%) strongly agreed or agreed that the instructions and guidelines for completing the NutriDash modules were easy to understand, and a similar proportion (72%) agreed or strongly agreed that understanding the functionality of the NutriDash platform was easy. Approximately two-thirds (64%) of respondents strongly agreed or agreed that the existing NutriDash platform easily accommodated all nutrition interventions in their country's programme area. Less than half (40%) of respondents strongly agreed or agreed that time spent collecting NutriDash data was minimal. Participants generally strongly agreed or agreed (83%) that minimal training was required to use and report to NutriDash and just under half (47%) of respondents believed that the process for NutriDash data validation was simple (figure 1C).

Reporting of nutrition data is simple provided that we have access to data. In some cases we do not have access to disaggregated data and when it is mandatory to respond to some of the questions, it is problematic.

**Table 2** Attributes assessed in the evaluation and overall percentage of strongly agree or agree responses that were selected by participants for each statement

Attribute and definition	Indicators measured	Overall percentage agreeing or strongly agreeing
Acceptability		71%
<i>Reflects the willingness of individuals and organisations to participate in the surveillance system</i>	My contribution/s and input/s to the existing NutriDash system is/are considered valuable	
	I receive adequate support in completing NutriDash modules	
	NutriDash is important/contributes to enhancing public health in my working area	
	The existing NutriDash system protects countries' data privacy and confidentiality	
Stability		68%
<i>Refers to the reliability (ability to collect, manage and provide data properly without failure) and availability of the system (ability to be operational when it is needed)</i>	The existing NutriDash system is reliable when reporting nutrition data	
	Problems experienced within the NutriDash system are addressed with minimal delays	
Simplicity		63%
<i>Refers to the structure and ease of operation of the system</i>	Reporting within the NutriDash system is easy	
	Modules for reporting nutrition data are easy to complete	
	Instructions and guidelines for completing NutriDash modules are easy to understand	
	Understanding the functionality of the NutriDash system is easy	
	The existing NutriDash system easily accommodates all nutrition interventions in my working area	
	Time spent collecting NutriDash data is minimal	
	Minimal training is required to use and report to NutriDash	
The follow-up process for NutriDash data is simple		
Data quality		60%
<i>Reflects the completeness and validity of the data recorded in the system.</i>	The modules within NutriDash are clear and easy to respond	
	Data from my working area are readily available in the format required for NutriDash	
	Missing data are not a common occurrence in modules in the NutriDash system	
	The electronic/hardcopy forms for each module within NutriDash are clear and appropriate	
	Training offered regarding the completion of NutriDash modules is adequate	
	Supervision offered for inputting data into NutriDash is adequate	
Time allocated for entering data into NutriDash is adequate		
Flexibility		58%
<i>Refers to the ability of the system to be able to adapt to changing information needs or operating conditions with little or additional time, personnel or allocated funds</i>	The existing NutriDash system is well adapted to reporting all nutrition interventions in my area of work	
	The existing NutriDash system easily adapts to changes in priorities of the nutrition landscape	

Continued



**Table 2** Continued

Attribute and definition	Indicators measured	Overall percentage agreeing or strongly agreeing
Usefulness		43%
<i>Reflects the actions taken as a result of analysis and interpretation of the data from the system</i>	NutriDash has helped to inform implementation of nutrition interventions over the past 1 year in this working area	
	NutriDash has helped to successfully address barriers to progress by identifying programme bottlenecks and designing solutions to address them	
	NutriDash has helped to attract donor funding for nutrition interventions	
	NutriDash has helped to detect trends in key nutrition indicators	
	NutriDash has helped to successfully guide countries in determining which nutrition indicators to track routinely in national monitoring systems	
	NutriDash has helped to determine supply needs for the coming year to avoid delays and ensure life-saving commodities reach children in need	
	The NutriDash system has stimulated research activities in this region	
The denominator is the total number of responses.		

**Data quality**

Over two-thirds of respondents (70%) strongly agreed or agreed that the modules within NutriDash were clear and easy to respond to, but only 39% of respondents strongly

agreed or agreed that data from their working area were readily available in the format required for NutriDash. Missing data were an issue for respondents, with under half strongly agreeing or agreeing that missing data were a



**Figure 1** Distribution of responses from the questionnaire. (A) Acceptability. (B) Stability. (C) Simplicity. (D) Data quality. (E) Flexibility. (F) Usefulness. Created by the authors.

common occurrence in modules in the NutriDash system. Two-thirds of respondents (66%) strongly agreed or agreed that the forms for each module within NutriDash platform were clear and appropriate and 69% strongly agreed or agreed that the training offered regarding the completion of NutriDash modules was adequate. With regards to the supervision offered for inputting data into NutriDash, 61% strongly agreed or agreed that this was adequate, while 72% strongly agreed or agreed that the time allocated for entering data into NutriDash was adequate (figure 1D).

Data (are) required from the Ministry of Health, which usually takes time, but in the last 2 years due to COVID-19 (they have) been particularly difficult to obtain—in some cases impossible.

The time for collection should be longer because other areas of the Ministry of Health are consulted.

### Flexibility

Two-thirds (65%) of respondents strongly agreed or agreed that the existing NutriDash system was well adapted to reporting all nutrition interventions in their area of work and half (50%) strongly agreed or agreed that the platform easily adapted to changes in priorities of the nutrition landscape (figure 1E).

Nutrition interventions (specific and sensitive) are all captured in NutriDash. During (the COVID-19 pandemic), NutriDash Lite was used to quickly collect some information, which was a form of adaptation.

### Usefulness

Around two-thirds (59%) of respondents strongly agreed or agreed that NutriDash had helped to inform implementation of nutrition interventions over the past year in their working area, but only 29% of respondents strongly agreed or agreed that NutriDash had helped to successfully address programme bottlenecks. Around one-quarter (26%) of respondents strongly agreed or agreed that NutriDash had helped attract donor funding for nutrition programmes. Over half (58%) of respondents strongly agreed or agreed that NutriDash helped to monitor trends in key nutrition indicators. There was some uncertainty surrounding whether NutriDash data had helped guide countries in determining which nutrition indicators to track routinely, with under half of respondents agreeing or strongly agreeing (42%) that the data had helped. Over two-thirds (65%) of respondents strongly agreed or agreed that NutriDash had helped determine supply needs for the coming year. One-quarter (25%) strongly agreed or agreed that it had stimulated research activities in their region (figure 1F).

NutriDash has been useful in supply forecasting, informing areas for strengthening data and stimulating accountability among actors on progress of various program areas. The area of bottlenecks and donor

funding in relation to NutriDash is an opportunity for improvement.

Yes, NutriDash can help to identify bottlenecks and in designing solutions

### Representativeness

Between 2013 and 2020, the number of countries reporting to NutriDash increased by 15%, from 109 to 125, resulting in an overall reporting rate of 79% (125/159).

### Stakeholder feedback

Some quotations have been condensed for privacy or readability purposes; indicated using (...). The content remains unchanged. External and internal stakeholder quotes from interviews are indicated by ES or IS, respectively.

### Use of the data

NutriDash data are used to inform programme planning, design and monitoring of global nutrition programme trends. The data are also used for reporting on UNICEF commitments in the UNICEF Strategic Plan<sup>19</sup> and for other global reporting commitments, such as the Global Breastfeeding scorecard<sup>18</sup> and the State of Acute Malnutrition.<sup>20</sup>

We get requests for reporting—how many countries now have (...) programmes, or how many countries are doing XY and Z intervention. NutriDash is a great source for that. It's more frequent than something like a (Demographic and Health Survey), which may or may not ask the exact question you need. (External stakeholder (ES))

The fact that pre-2009, the world had no way of knowing how many children were being treated annually is insane, but it's also a great testament to the contribution NutriDash has made to this space, and the global conversation on whether or not we are on track to achieve universal coverage. This can only be answered because NutriDash does what it does. (Internal stakeholder (IS))

NutriDash data are also used for internal communications and production of knowledge products, such as reports, dashboards and academic publications, as well as for donor accountability.

The main thing we've used it for is the breastfeeding scorecard that we put out every year. And for that we wanted to have an indicator for each of the policy asks that we put forward a number of years ago, (...) so we pulled two indicators from the NutriDash system. (ES)

NutriDash is our main source of information when we're preparing our reports for donors, and our annual reports, as well as for all the updates that are used internally for the executive director's letter, etc. (IS)



External stakeholders were positive about NutriDash data, acknowledging the large amount of work that UNICEF (headquarters and country offices) puts into ensuring that the reported data are accurate. Stakeholders commented on the utility of NutriDash as a global good to understand the status of nutrition programmes at country, regional and global level.

It's this great resource. I commend them for all the work that they put in, and I have to say that UNICEF is so good at making sure that the data that they collect, and share (are) accurate and reliable. It's like a value that they have, and so when you work with them and you want to use the data that they're sharing, you know that (they are) solid data and I really respect that. (ES)

### Suggestions for improvement

#### Communication

Four out of five external stakeholders stated that clearer communication was needed from UNICEF about when data from NutriDash would be released. Most stakeholders understood that the data would be made available on an annual basis and would relate to the year before, but participants often described having to contact UNICEF to either gain access to the data or to find out when they would be made available to view online, making it difficult to plan programmes.

I'd like an email that goes to everyone with all the publications, just making sure it gets good dissemination everywhere. (ES)

Three out of four UNICEF staff members interviewed commented that more work was needed to communicate with country office staff the importance of their data submission, to ensure that the quality of data being submitted to NutriDash were of the highest standard.

We also need to be better at sharing back information to countries and regions as to why their entry is so important and they're not just entering into a vacuum, they're actually informing global policy. (IS)

#### Accessing the data

External stakeholders noted limitations in accessing and sharing NutriDash data. Currently, users are required to have a password-protected account and are asked to log in each time they want to use the data. It was noted that this can make it hard to share the data with others.

I went to the website once and I found it cumbersome as you have to log in, and there are so many usernames now that if the data (aren't) essential for me to access, the barrier of not being able to remember my password means I'm not going to even try again. (ES)

One common theme between all external stakeholders was the fact that NutriDash data are aggregated. Stakeholders wanted to be able to download the raw data and

perform their own manipulations, analyses and visualisations, but understood it was often difficult to obtain disaggregated data due to some countries not giving permission to UNICEF to share their data externally.

There are not many ways to adapt the data. (...) And because that's not given to you in a .csv you can't manipulate the data and create your own visualization, like your own graph or chart, to show the data that you'd like. And it's really hard to pinpoint exact country data unless you want to sift through a whole country report because you can't download .csv data. (ES)

UNICEF staff also agreed that greater efforts could be made to promote NutriDash and make it more user-friendly.

There's still a piece around how can we really facilitate the interface between the public at large and the data so that people can run the analysis that they want using our platform, not just extracting the raw data. (...) How can we give them a versatile enough platform that people could say, OK, I want to mix and match this indicator that indicator and this indicator for this time period. (IS)

#### Data quality

There was consensus among external stakeholders that the data provided by NutriDash often lacked denominators, making it difficult to estimate the coverage of certain programmes.

We struggled with the NutriDash data because we never had a denominator, and so it became really difficult to use (those) data effectively. One of the reasons why we were using the data was to compare across countries and kind of take stock for each country, how they're doing, and be able to kind of have a reference point or it was a comparative objective and sometimes we found the NutriDash data difficult to use from that perspective. (ES)

UNICEF staff gave suggestions on how to ensure the data collected were of the highest quality, ranging from working with countries to formulate more specific questions to automatic flagging of potentially incorrect data and providing continued technical guidance and support to strengthen systems.

### DISCUSSION

UNICEF is committed to strengthening national capacities to generate and report quality and timely maternal and child nutrition data to inform nutrition policies, strategies and programmes,<sup>9</sup> while tracking progress towards meeting the SDGs. NutriDash is the only system that captures and reports global nutrition programme monitoring data; it therefore provides a strategic opportunity to track and inform country progress. This is the first formal

review of NutriDash that has adapted the comprehensive and rigorous CDC surveillance evaluation framework to provide a detailed summary of its processes, strengths and weaknesses. Users of NutriDash, including those who enter data into the system and stakeholders who use the data generated from the system, were engaged to give a well-rounded perspective. Based on responses, the NutriDash system showed good performance in terms of most of the indicators and attributes measured. It also demonstrated a high level of acceptability, with more than half of responses agreeing or strongly agreeing with the statements within most attributes. Internal and external stakeholders both saw the value in NutriDash but were also able to identify common themes for improvement.

External stakeholders, who use the finalised data from NutriDash, commented that improvements in communication from UNICEF were needed with regard to dissemination of NutriDash to help with planning purposes. Issues with data dissemination are common, with results from an online survey<sup>21</sup> aimed at nutrition stakeholders revealing that stakeholders have a strong interest in timely data and that investment and expansion of information systems needs to continue so they can be provided with this information. Multiple evaluations<sup>22 23</sup> of similar systems have also shown that broader data dissemination is an important way to improve the usefulness of information systems and that more frequent reporting can also enhance the utility of systems.<sup>23</sup> One evaluation suggestion was to create a two-page summary sheet for dissemination to all partners.<sup>24</sup>

Similarly, almost all the UNICEF stakeholders recognised that more work was needed to communicate with staff members responsible for NutriDash submissions to ensure that they understood the value of their data submissions in informing global policy and the importance of improving the quality of the data they submit. NutriDash user feedback also revealed that this was an area to be improved. Research has suggested that increased awareness of the importance of timeliness could help with reducing any reporting delays from those responsible for inputting data which in turn, would increase data quality.<sup>25 26</sup> One suggestion to help team members realise the value and importance of their work was to increase engagement through training opportunities.<sup>27 28</sup> However, it has been argued that training alone is insufficient to build this awareness, and it must be coupled with efforts to hold regular meetings, data reviews and mentoring opportunities in the use of data in decision-making to successfully engage workers so that the value of data and their input is demonstrated to them.<sup>29</sup> For NutriDash, the data generated can only be as good as the national nutrition data generated at the country level and challenges remain that may prohibit collection and reporting of essential nutrition data via NutriDash in certain countries or contexts.

Both internal and external stakeholders commented that the NutriDash platform can be difficult to access due to it being password protected. This was common in

### Box 1 Priority action recommendations based on the review that will inform improvement actions to NutriDash

#### Enhanced communication

⇒ Heightened communication is needed with people inputting data into NutriDash to help them understand the importance of their contribution. A set release date each year for NutriDash data is to be agreed upon and communicated with users of the data.

#### Improved access to the data

⇒ From an external perspective, access to the NutriDash data can be cumbersome. Removing some of the barriers to access (eg, usernames and passwords) will improve accessibility and facilitate data sharing to benefit the nutrition landscape. UNICEF will strive to present as much disaggregated data as possible if permissible by individual countries.

#### Enhanced data quality checks

⇒ Data quality was recognised by both those inputting data into NutriDash and those using the data as an issue. UNICEF will continue to advocate for inclusion of key nutrition indicators in national health management information systems and work with governments and partners to improve the quality and reliability of the information collected. UNICEF will explore more enhanced methods of automating the system to flag potentially incorrect data to users, facilitating accurate data capture. UNICEF will ensure all acronyms and abbreviations are properly defined.

another study,<sup>30</sup> which demonstrated that there are difficulties in balancing user-friendly interfaces with modification abilities to meet users' needs. One of the main barriers to wide dissemination of data is that some countries do not agree to share their data outside of UNICEF. A systematic review<sup>31</sup> that identified barriers to data sharing in public health noted that in some cases, aggregated data may not be sufficiently detailed for certain applications but solutions to these legal barriers are difficult to overcome.

#### Improvement actions

Based on this review, three main areas for improvements to NutriDash were identified which will be used by UNICEF to inform improvement actions (Box 1).

First, enhanced communication is required between UNICEF HQ and country offices and between UNICEF and external users of the data. A fixed annual release date will be established and communicated to stakeholders to aid with planning. Despite stakeholders understanding the importance of NutriDash data, this review has shown that more communication with country offices is required to ensure they are aware of the importance of their contribution and why high-quality data are important. This could be in the form of written materials, such as reports, webinars or online drop-in question and answer sessions.

Second, accessibility of the data must be improved. One suggestion would be to make dashboards open access and only require password protection for more specific data sets or results. In an ideal scenario, data would be available at the country level; however, this can be difficult due to countries not always agreeing to share data externally.



Making the interface more interactive and allowing users to have access to a platform where data manipulation could occur, but without the need for downloading raw datafiles, would also increase usability of the data while ensuring data confidentiality is maintained. This is being considered in the current upgrade of the NutriDash platform and is expected to be tested in 2022.

Third, all participants of this review raised issues with the quality of data, from some questions not being relevant for all countries, to missing denominators. Strength and reliability of NutriDash data fundamentally relies on the nutrition information systems that are established in countries to monitor nutrition programmes; in some countries, the mechanisms to collect data on indicators for certain modules have not been fully established. UNICEF will continue to work with countries to improve national monitoring systems to ensure good quality data.

### Strengths

Multiple information sources were used to collect evidence and questionnaire responses came from multiple countries. Interview bias was mitigated by having one member of the evaluation team (BS) who was external to UNICEF collect data and carry out stakeholder interviews and analysis. The N/A option in the questionnaire was designed to eliminate participants who otherwise would have been indecisive in their responses.

### Limitations

Not all stakeholders who were invited to interview chose to participate, which means a selection bias may exist as they may have held a more skewed opinion of the system (positive or negative). Although responses to the questionnaire were received from a broad range of countries, a 100% rate was not achieved. The methods of calculating the per cent of participants agreeing or strongly agreeing means that the likelihood of achieving an >50% threshold is increased. Since the review was commissioned by stakeholders who run and maintain NutriDash, they were not included in the review, meaning a complete evaluation of the system was not possible. Though we interviewed a wide range of stakeholders from multiple organisations, we were not able to gather the views of all stakeholders which may have affected our findings and recommendations.

This review was limited by the fact that, to the best of our knowledge, there are no guidelines openly available that have a purpose for critically reviewing systems like NutriDash. The CDC guidance needed to be adapted as it is focused on the evaluation of communicable disease surveillance systems, and some of its suggested attributes to measure were thus not applicable to NutriDash. In addition to this, some attributes measured may be more or less important than others and may therefore require weighting; but due to unavailability of guidance, this could not be done.<sup>32 33</sup> It is recommended that specific guidance be developed to assess information systems.

### CONCLUSIONS

To meet the global commitment to end hunger and malnutrition by 2030, robust data on nutrition are needed. Governance for maternal and child nutrition is strengthened through strategic data, knowledge and advocacy.<sup>9</sup> NutriDash provides a strategic opportunity to generate and report nutrition programme data to inform policies and programmes, but also to track progress of the key result areas as outlined in UNICEF's Nutrition Strategy 2020–2030,<sup>9</sup> in addition to global targets. The NutriDash system has been reviewed using a mixed-methods approach to identify what works well and what could be improved. This review will also form a baseline for future periodic reviews to continuously enhance NutriDash to improve availability of timely quality nutrition programme data. Three key areas for improvement were identified: communication, data accessibility and data quality. UNICEF will continue to work closely with governments and partners to improve monitoring systems in countries to ensure the right to nutrition for every child. In addition, UNICEF will continue to strategically engage with countries and key partners to improve the quality and implementation of each step of the NutriDash data value chain—including data generation, analysis, dissemination and use—to provide timely and quality data for monitoring global maternal and child nutrition programmes.

**Twitter** Bethan Swift @bethan\_swift

**Acknowledgements** We are grateful to all UNICEF Nutrition staff, governments and partners at the country and regional level for their contributions to the NutriDash platform and global reporting initiative. We thank all questionnaire and interview participants for their time and extremely useful feedback.

**Contributors** BS substantially worked on conception and design of this project, acquisition, analysis, interpretation of the data and wrote the first draft. LM, AI and CHPG worked on conception, questionnaire design, manuscript revisions, gave final approval to be published and agreed to be accountable for all aspects of the work. LM and AI act as guarantors.

**Funding** The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

**Map disclaimer** The inclusion of any map (including the depiction of any boundaries there), or of any geographic or locational reference, does not imply the expression of any opinion whatsoever on the part of BMJ concerning the legal status of any country, territory, jurisdiction or area or of its authorities. Any such expression remains solely that of the relevant source and is not endorsed by BMJ. Maps are provided without any warranty of any kind, either express or implied.

**Competing interests** BS worked on this project as part of a paid internship at UNICEF.

**Patient and public involvement** Patients and/or the public were not involved in the design, or conduct, or reporting or dissemination plans of this research.

**Patient consent for publication** Not required.

**Ethics approval** This study involves human participants but was not approved. Informed consent was taken from all questionnaire participants (written) and all interviewees (oral). No ethics review and approval were required because the project was regarded as a service review instead of research. Participants gave informed consent to participate in the study before taking part.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data availability statement** Data are available from the authors upon reasonable request and with permission of UNICEF.

**Supplemental material** This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

**Open access** This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

#### ORCID iD

Bethan Swift <http://orcid.org/0000-0002-1411-2973>

#### REFERENCES

- Black RE, Victora CG, Walker SP, *et al*. Maternal and child undernutrition and overweight in low-income and middle-income countries. *Lancet* 2013;382:427–51.
- Black RE, Allen LH, Bhutta ZA, *et al*. Maternal and child undernutrition: global and regional exposures and health consequences. *Lancet* 2008;371:243–60.
- UNICEF. The state of the world's children 2019. 2019. Available: <https://www.unicef.org/reports/state-of-worlds-children-2019> [Accessed 1 Sep 2020].
- UNICEF. Global nutrition report 2018 - UNICEF DATA. 2018. Available: <https://data.unicef.org/resources/global-nutrition-report-2018> [Accessed 2 Sep 2020].
- UNICEF, WHO, World Bank. *Levels and trends in child malnutrition; UNICEF/WHO/world bank group-joint child malnutrition estimates*. 2021: 32. Available: <https://data.unicef.org/resources/jme-report-2021>
- Akseer N, Kandru G, Keats EC, *et al*. COVID-19 pandemic and mitigation strategies: implications for maternal and child health and nutrition. *Am J Clin Nutr* 2020;112:251–6.
- UNICEF. *Global nutrition programme monitoring; nutridash 2019 key findings*. New York, 2021.
- United Nations. Goal 2: zero hunger - united nations sustainable development. In: *Goal 2 Zero Hunger*. 2018: 1–5. Available: <https://www.un.org/sustainabledevelopment/hunger>
- United Nations Children's Fund. (UNICEF). *Nutrition, for every child UNICEF nutrition strategy 2020–2030*. UNICEF, 2020: 1–98. Available: [www.unicef.org](http://www.unicef.org)
- International Food Policy Research Institute (IFPRI). 2014 global nutrition report data. 2014. Available: <https://globalnutritionreport.org/reports/2014-global-nutrition-report>
- Nutrition Data Partners Group. *Nutrition for growth summit | tokyo 2021 shaping commitments to improve nutrition data and accountability in support of food, health and prosperity for all*. 2021.
- UNICEF. UNICEF - nutridash 2.0. n.d. Available: <https://www.unicefnutridash.org/login>
- Centers for Disease Control and Prevention (CDC). Updated guidelines for evaluating public health surveillance systems. 2007. Available: <https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5013a1.htm>
- Liker R. A technique for measurement of attitudes. *Archives of Psychology* 1932;22:55. Available: [https://www.scirp.org/\(S\(lz5mqq453edsnp55rgjct55\)\)/reference/ReferencesPapers.aspx?ReferenceID=534541](https://www.scirp.org/(S(lz5mqq453edsnp55rgjct55))/reference/ReferencesPapers.aspx?ReferenceID=534541)
- Maguire M, Delahunt B. Doing A thematic analysis: A practical, step by step guide for learning and teaching. *AISHE-J* 2014;50:3135–40.
- Kleinheksel AJ, Rockich-Winston N, Tawfik H, *et al*. Qualitative research in pharmacy education: demystifying content analysis. *Am J Pharm Educ* 2020;84:127–37.
- UNICEF. Child nutrition - UNICEF DATA. UNICEF for every child. 2019. Available: <https://data.unicef.org/topic/nutrition/child-nutrition> [Accessed 20 Dec 2020].
- The Global Breastfeeding Collective. Global breastfeeding scorecard | UNICEF global breastfeeding collective. 2021. Available: <https://www.globalbreastfeedingcollective.org/global-breastfeeding-scorecard> [Accessed 23 Nov 2020].
- UNICEF. UNICEF strategic plan, 2022–2025. 2021. Available: [https://www.unicef.org/executiveboard/documents/UNICEF\\_Strategic\\_Plan\\_2022–2025-SRS-2021](https://www.unicef.org/executiveboard/documents/UNICEF_Strategic_Plan_2022–2025-SRS-2021) [Accessed 16 Nov 2022].
- No Wasted Lives. The state of acute malnutrition. 2019. Available: <https://www.nowastedlives.org/state-of-acute-malnutrition> [Accessed 15 Feb 2020].
- Buckland AJ, Thorne-Lyman AL, Aung T, *et al*. Nutrition data use and needs: findings from an online survey of global nutrition stakeholders. *J Glob Health* 2020;10:020403.
- Yang L, Weston C, Cude C, *et al*. Evaluating Oregon's occupational public health surveillance system based on the CDC updated guidelines. *Am J Ind Med* 2020;63:713–25.
- Tosti ME, Longhi S, de Waure C, *et al*. Assessment of timeliness, representativeness and quality of data reported to italy's national integrated surveillance system for acute viral hepatitis (SEIEVA). *Public Health* 2015;129:561–8.
- Collineau L, Godebert E, Thibaut S, *et al*. Evaluation of the French surveillance system for epidemiological surveillance of antimicrobial resistance in the community and nursing homes. *JAC Antimicrob Resist* 2022;4:dla0078.
- Sahal N, Reintjes R, Aro AR. Review article: communicable diseases surveillance lessons learned from developed and developing countries: literature review. *Scand J Public Health* 2009;37:187–200.
- Nelesone T, Durrheim DN, Speare R, *et al*. Short communication: strengthening sub-national communicable disease surveillance in a remote Pacific island country by adapting a successful African outbreak surveillance model. *Trop Med Int Health* 2006;11:17–21.
- Mremi IR, Sindato C, Kishamawe C, *et al*. Improving disease surveillance data analysis, interpretation, and use at the district level in Tanzania. *Glob Health Action* 2022;15:2090100.
- Wilkins K, Nsubuga P, Mendlein J, *et al*. The data for decision making project: assessment of surveillance systems in developing countries to improve access to public health information. *Public Health* 2008;122:914–22.
- Mutale W, Chintu N, Amoroso C, *et al*. Improving health information systems for decision making across five sub-saharan african countries: implementation strategies from the african health initiative. *BMC Health Serv Res* 2013;13 Suppl 2:S9.
- Hazel E, Wilson E, Anifalaje A, *et al*. Building integrated data systems for health and nutrition program evaluations: lessons learned from a multi-country implementation of a DHIS 2-based system. *J Glob Health* 2018;8:020307.
- van Panhuis WG, Paul P, Emerson C, *et al*. A systematic review of barriers to data sharing in public health. *BMC Public Health* 2014;14:1144.
- Calba C, Goutard FL, Hoinville L, *et al*. Surveillance systems evaluation: a systematic review of the existing approaches. *BMC Public Health* 2015;15:448.
- Lucero-Obusan C, Oda G, Mostaghimi A, *et al*. Public health surveillance in the U.S. department of Veterans Affairs: evaluation of the praedico surveillance system. *BMC Public Health* 2022;22:272.
- Twycross A, Shorten A. Service evaluation, audit and research: what is the difference? *Evid Based Nurs* 2014;17:65–6.