



“Fill the nutrient gap” diet modelling and situation analysis contributes to multisectoral policy and programme decision-making[☆]

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ABSTRACT

This study examined how The World Food Programme's Fill the Nutrient Gap (FNG) situation analysis has facilitated decision-making to support nutrition. Semi-structured interviews were held with 60 'broker', 'technical analyst' and 'consumer' end users of the FNG in 11 countries. Almost all FNG cases, especially those conducted in 'development' contexts, had objectives of informing government decision-making, with some, especially in 'fragile' settings, also focused on informing WFP's own programming. The FNG was credited with contributing evidence to national or sub-national nutrition strategy development, informing advocacy and building momentum and improving understanding around key nutrition issues. Internally, the FNG helped promote WFP's nutrition-sensitive programming approaches. This article discusses these findings and explores how the FNG's policy contribution could be strengthened in future applications.

1. Introduction

Context-specific and coordinated actions are required across multiple sectors to address direct, underlying and basic causes of malnutrition (Barling and Fanzo, 2019; Bose et al., 2019; IFPRI, 2017). However, budget allocations for nutrition are limited in most low- and middle-income country (LMIC) contexts and decision-makers need to prioritise the most necessary and effective nutrition-specific and -sensitive actions (Bergeron, 2018). As such, there is a need for the rapid generation of evidence to inform the effective prioritisation of actions across systems, and encourage further commitment, both by national actors and international organisations (Herforth et al., 2012; Herforth and Ahmed, 2015; Kanter et al., 2015; Bose et al., 2019).

The World Food Programme's (WFP) Fill the Nutrient Gap (FNG) nutrition situation analysis tool, summarised in Fig. 1, can rapidly determine the extent to which nutritious diets are accessible and model the potential of different interventions across food, agriculture, health, social protection and education systems to improve nutritious diet access and close nutrient gaps (Bose et al., 2019, 2018; Deptford et al., 2018; Klemm and de Pee, 2019). The FNG was launched by WFP in 2016 and, to date, it has been applied by WFP, in partnership with national

government representatives, in over 50 countries.

The FNG is one of several nutrition modelling tools that can provide evidence to support decision-making at different stages of nutrition policy and programme development (Bergeron, 2018; Brown et al., 2015; Daelmans et al., 2013; Deptford et al., 2013; Ferguson et al., 2006; Robertson et al., 2017; Stegmuller et al., 2017; Walters et al., 2019). Many of these nutrition modelling tools are widely used in nutrition practice by governments and the development partners and academic institutions supporting them (Bergeron, 2018). However, use cases of nutrition modelling tools have generally not been captured in scientific literature. Instead, the literature on nutrition modelling tools has generally been limited to model development and methods and results from individual applications, rather than processes of applying the tools and their impact on policy or programme decisions (Baker et al., 2015; Bryce et al., 2010; Robertson et al., 2017; Stegmuller et al., 2017; Walker and Friberg, 2017). A study evaluating the policy influence of evidence generation and advocacy activities for nutrition in Southeast Asia found that policy influence occurred through a series of intermediate steps, such as stimulating understanding, building momentum, bringing actors together, generating commitment and informing decision-making (Michaud-Létourneau et al., 2019a). Some of the authors from this

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paper recently conducted a broader study in response to the limited evidence on nutrition modelling tool applications and influence on policy decision-making (Knight et al., 2022). This study examined the application of 12 different nutrition modelling tools, including the FNG, across 30 case studies (Knight et al., 2022). We found nutrition modelling tool applications had contributed to improved understanding of nutrition issues and risk factors, galvanising stakeholders, getting issues on the agenda, and fostering enabling environments for nutrition, as well as directly informing policy and programme decisions (Knight et al., 2022).

To date, much of the understanding of FNG applications and policy uptake remains anecdotal. An improved understanding of how evidence resulting from the FNG has been used and what has resulted from its application could assist decision-makers in LMICs to understand what this tool can do, decide whether to apply it in their context and advocate for resources to do so. Further, understanding processes that encourage uptake and use of evidence from the FNG could result in more meaningful, useful and relevant applications of the analysis. The objectives of this study were to document examples of FNG applications and understand how FNG outputs have been used, the extent to which objectives were met and how the FNG has contributed to policy and programme decision-making in diverse country contexts.

2. Methods

This qualitative study used an in-depth case study methodology to

document FNG applications in diverse country contexts. The study sought to explore the analytical objectives of each case study, how FNG outputs had been used, why and by whom, and to document reported contributions to policy or programme decision-making.

The WFP Headquarters team responsible for the FNG provided a list of all FNG analyses that had been undertaken since the tool was launched in 2016. Case studies were randomly selected from the 30 FNG analyses that had been completed at least 12 months prior to data collection. The 12-month time limit was set to ensure there had been a minimum amount of time after the analysis was completed and results were disseminated for outputs to be used to inform any decision-making. Cases were chosen at random to avoid selection of the most favourable FNG case studies only. A target of ten country case studies was set to capture variation in geographical regions, country contexts and time of application. Eleven case studies were randomly selected, to ensure that the minimum target of 10 would be met if engagement with potential participants was unsuccessful or if extenuating circumstances (political upheaval or change, conflict or other emergencies) meant communication with and participation of end users in any one country was not possible. However the engagement and participation was successful in all countries, meaning one additional case was included. The geographic distribution, income classification and classification as development or fragile contexts, of the final 11 case study countries is provided in Table 1 (Fund for Peace, 2020; OECD, 2020; The World Bank, 2020a, 2020b).

Purposive and snowball sampling were used to identify interview

The Fill the Nutrient Gap (FNG) nutrition situation analysis identifies barriers to adequate nutrient intake sub nationally and for different vulnerable populations and compares possible solutions from multiple sectors to address these barriers. Once likely nutrient gaps and barriers to adequate intake are identified, interventions from the health, agriculture, education, social protection, and food systems (or packages of such interventions), are modelled and compared in terms of their potential to improve access to nutritious diets. The aim of the FNG analysis is to support decision-making across different sectors on the prioritisation of actions to prevent malnutrition. By setting a target of meeting recommended nutrient intakes rather than health outcomes, the FNG creates a level playing field for comparing nutrition-sensitive and -specific interventions across systems and the lifecycle.

The FNG analysis is based on three principal components:

1. **Analysis of secondary data to characterise the nutrition situation**
2. **Diet modelling in the Cost of the Diet linear programming tool (Deptford et al., 2017)**
3. **Intervention modelling and prioritisation**

Using a lifecycle lens, the FNG expands the target groups, for example through the inclusion of school-aged children and adolescents in the analysis. A food systems approach examines both the supply side and the food environment, for example, by comparing how supply would need to change to meet increased demand for healthier diets, and how constraints and behaviours drive food choices.

Process:

The FNG is done to support decision-making, by government and non-government actors across different sectors, on the prioritisation of actions to prevent malnutrition. The FNG approach, in terms of analysis focus and who conducts the analysis, is designed to be flexible and adaptable to the local context, stakeholder priorities, data availability and policy and programme questions. The FNG is intended to be a participatory process, with the involvement of multiple and diverse stakeholders, as the aim is to support decision-making within a country across sectors. Detailed stakeholder engagement before, during and after the analysis is recommended to ensure all potential interventions are identified, preliminary findings are reviewed by stakeholders, the modelling is iterative, and results and recommendations are relevant to programme and policy questions and most likely to be acted upon.

Fig. 1. An overview of the Fill the Nutrient Gap (FNG) Situation Analysis.

Table 1

Selected case studies by geographic region, income classification and context.

Analysis Region	World Bank Country Income Classification ^a			Country Context ^b		Total
	Low Income	Low middle income	Upper middle income	Development context	Fragile context/areas	
Central Asia	1	0	0	0	1	1
East Africa	2	0	0	2	0	2
Latin America	0	0	1	1	0	1
South Asia	0	2	0	1	1	2
Southeast Asia	0	2	0	1	1	2
Southern Africa	2	0	0	0	2	2
West Africa	1	0	0	0	1	1
Total	6	4	1	5	6	11

^a Based on classifications from the World Bank Country and Lending Groups ([The World Bank, 2020a](#)).^b Based on The World Bank Fragile and Conflict-affected Situations Classification ([The World Bank, 2020b](#)), OECD States of Fragility report ([OECD, 2020](#)) and Fragile States Index (Index, 2020).

participants ([Atkinson and Flint, 2001](#)). Global and country-level WFP staff provided a list of local key informants for each selected case study country. The key informants were asked to identify individuals who were involved in the FNG in their country, representing the three nutrition modelling tool ‘end user’ groups according to the definitions previously used by the Nutrition Modellers’ Consortium ([Knight et al., 2022](#)). These end user groups were (1) “Brokers” who proposed, coordinated, or provided resources towards a FNG application; (2) “Technical analysts” who conducted a FNG analysis; and (3) “Consumers” who would ideally use FNG outputs to inform advocacy and decision-making ([Fig. 2](#)) ([Knight et al., 2022](#)). Those individuals identified and invited to take part in the study were then asked to list other ‘end users’ who were also involved in the FNG application. This process was repeated until at least one participant per end user group, one participant from government and one non-government and non-WFP participant per country were identified and until saturation, in terms of participants expressing what had already been reported in other interviews, occurred ([Saunders et al., 2018](#)). Of the 64 individuals who were invited to participate, three did not respond to the invitation and one refused, stating they were too busy. In these cases, alternative participants were identified. Interviews were conducted with a total of 60 key informants ([Table 2](#)), including government staff from Health, Agriculture and Planning ministries and research bodies ($n = 19$), local and international staff from WFP, inclusive of staff in WFP-funded positions seconded to government agencies ($n = 30$) and local and international staff from Non-Government Organisations (NGO) and other United Nations (UN) agencies, which also included externally-funded staff seconded to government agencies ($n = 11$) ([Table 2](#)).

The study’s guiding conceptual framework was adapted from the framework from a study of the policy influence of 12 different nutrition modelling tools ([Knight et al., 2022](#)). The framework consists of six interconnected nutrition policy cycle stages; 1) advocacy, 2) situation

Table 2

Interview participants by case study location, affiliation and sex.

	Broker	Technical Analyst	Consumer	Total
Case Study Location				
Central Asia	2	3	1	6
East Africa	2	3	5	10
Latin America	3	1	3	7
South Asia	3	3	3	9
Southeast Asia	5	2	8	15
Southern Africa	3	2	5	10
West Africa	2	0	1	3
Affiliation of interview participants				
Government	2	0	17	19
Other UN and NGOs	2	2	7	11
WFP	16	12	2	30
Sex of interview participants				
Female	12	9	18	39
Male	8	5	8	21
Total	20	14	26	60

assessment, 3) intervention prioritisation, 4) policy or programme review and development, 5) resource allocation and 6) evaluation ([Knight et al., 2022](#)). Interviews were conducted using a detailed and consistent interview guide that was developed using this conceptual framework and explored the following subjects:

- Analysis objectives
- Process for planning and carrying out the FNG analysis
- Uptake and use of FNG results and recommendations
- Perceived influence or contribution of the FNG across the nutrition policy cycle
- Factors influencing FNG application or contribution to policy uptake and decision-making

Brokers	Individuals/organisation who called for or funded the tool use.
Technical analysts	Those who conducted the analysis including members of the WFP Headquarters FNG team as well as nutrition and other programme-level staff from WFP Country Offices and Regional Bureaux and external analysts.
Consumers	Policymakers and programme planners who asked initial analysis questions and used the modelling findings to inform decision-making, including government SUN coordinators* and other policy-level government representatives, senior WFP Country Office management,

*SUN Coordinators or Focal Points are high-level government staff considered well placed to unite the nutrition community in each SUN Country and act as leaders in challenging cross sectoral and multi-stakeholder environments and are often at the forefront of elevating nutrition up the national agenda (SUN Movement, 2015).

Fig. 2. End user categories.

All questions were open-ended. Probes were used for clarification if more information was required or to explore themes raised by participants.

Interviews were conducted in-person ($n = 27$) or via web conference ($n = 33$) by the first author between March 2019 and March 2020, in English, Spanish and Portuguese. Participants were provided with an information sheet on the study and given the opportunity to discuss objectives, measures to protect data and confidentiality and any other questions prior to providing informed consent. Where possible, and with permission, interviews were digitally recorded, transcribed and, if necessary, translated into English. When recording was not possible detailed notes were taken. De-identified data were organised, coded and analysed in NVivo 12 (QSR International Pty Ltd, 2012). Approval for this study was obtained from the LSHTM Research Ethics Committee (ref 16729).

Data were analysed using Reflective Thematic Analysis (RTA), which is a theoretically flexible approach for developing, analysing and interpreting patterns in qualitative data from diverse participants. RTA allows the inductive and deductive creation and exploration of themes across the whole analysis process (Braun et al., 2018; Braun and Clarke, 2006, 2018). Following Braun and Clarke's six-steps to RTA, (1) all data were reviewed to provide familiarity, then (2) were coded, first deductively using topics from the conceptual framework and then inductively using topics emerging from the data (Braun and Clarke, 2006, 2018, 2019, 2021). Codes were (3) grouped under broader themes to reflect key concepts, then (4) data, coding, codes and themes were reviewed again to check for completeness and representativeness. Once the list of codes and themes had been finalised, (5) the focus of each overall theme and individual codes was defined and (6) illustrative quotes were chosen and assigned to these. Reported FNG objectives, uses and programme or policy 'contributions' were examined and triangulated between participants within case studies as well as more broadly across case studies.

3. Findings

Findings are presented below and summarised in the corresponding tables. Table 3 provides an overview of the three models for the FNG data analysis reported across cases. Table 4 summarises the FNG's objectives, uses and users of analysis outputs and influence or contributions to decision-making of each case study. Table 5 provides an overview of the main findings across case studies, specifically reasons for applying the FNG, how the FNG outputs were used and reported influences.

3.1. FNG process

Government representatives, often coordinated by national Scaling Up Nutrition (SUN) focal points, played a role in the FNG process in almost all cases. As summarised in Table 3, this was either through the formation of technical working groups (TWG) who set analysis objectives and periodically reviewed and discussed inputs and outputs or, where feasible and requested, training and support for local stakeholders to conduct the analysis themselves. Strong government involvement throughout the entire FNG process was credited with fostering understanding and ownership of the FNG outputs, which encouraged the ongoing use of analysis outputs.

The government, through the SUN secretariat and various other platforms, were the main body driving this (FNG) and making key decisions about the analysis methods and dissemination.

Government 'Consumer', Pakistan

We met every two weeks, exchanged between the different ministries, got to know each other more than just at the level of public politics. It was great to help us understand what was happening and working together across sectors was an unexpected benefit.

Table 3

Documented processes for the FNG analysis.

Model	Frequency	Finding
1. Team of International WFP analysts carry out analysis, mostly independently, with some inputs from WFP country office	Few ($n = 2$) case studies	Approach in a few early FNGs. Considered a sub-optimal approach by brokers, technical analysts and consumer end users. Some difficulties reported by local stakeholders in understanding methods and findings.
2. International WFP analysts carry out analysis with inputs and review from local technical working group (TWG) and other stakeholders	Many ($n = 6$) case studies	Most common approach. TWG members, consisting of national government and non-government nutrition stakeholders, actively involved in preparing and validating data inputs, developing and providing details for the modelling plan and reviewing results. Detailed presentations provided at different points in time to promote TWG member understanding of methods, data requirements and results.
3. Local teams, consisting of government and other stakeholder staff, trained to conduct analysis with dedicated support from WFP analysts	Some ($n = 3$) case studies	Upon request government and non-government staff trained to conduct the FNG analysis (diet cost and affordability component) in some cases, especially in recent years. WFP trainers oversaw and supported analysis. Considered resource intensive but valuable for promoting ownership and building capacity.

Government 'Consumer', Ecuador

The Technical Working Group (TWG) was convened by the SUN coordinator to shape the analysis and decide on modelling. The whole TWG was actively involved in validating the FNG also. We could not call it (the FNG report) final without their blessing. The SUN coordinator asked, 'do you agree, do you endorse?'.

WFP-CO 'Broker', Rwanda

Several broker end users, mainly those external to government, felt the FNG helped build or strengthen relationships with government counterparts and other nutrition stakeholders. These respondents felt by responding to government-identified priorities, encouraging joint work towards a shared outcome and shared ownership of the analysis, the FNG process built trust, which contributed to a more enabling environment for nutrition policy.

3.2. Analysis objectives

In some cases, FNG applications had general objectives of strengthening advocacy for nutrition in general. The FNG was seen as source of novel metrics to capture the attention of decision-makers and call their attention to the dire need for investment in nutrition actions or for appreciating the influence that diet cost and affordability have on diets, nutrient intake and, ultimately, nutritional status. Other FNGs, mostly in development contexts, had secondary objectives of informing, justifying or galvanising specific, existing advocacy efforts. This included highlighting issues of nutritious diet access, the nutritional vulnerability of key groups or the potential contribution of interventions, such as food fortification, to encourage multisectoral commitment to nutrition and stimulate policy change and resource prioritisation. The FNG was viewed as a platform for engaging and building or strengthening relationships with government and development partners, especially those from different sectors (e.g. social protection), for action on prioritised

Table 4

Summary of FNG objectives, use and reported influence, by case study.

Case study location and timing	Objectives of the FNG application	Reported use and users of FNG outputs	Reported influence of the FNG
Tajikistan 2018	Characterise the nutrition situation in the country and factors that contribute to this and identify programmatic responses that could be implemented by Government, WFP and partners Provide evidence to contribute to fortification advocacy efforts and inform the WFP Country Strategic Plan development	WFP and government used FNG to inform a series of discussions on introduction of mandatory flour fortification WFP used FNG to advocate internally for nutrition sensitive approaches to existing school feeding programmes	FNG was used in the re-design of WFP school feeding programme, with a focus on nutritional quality of school meals. Further, FNG was credited with the inclusion of a special outcome in the WFP Country Strategic plan on capacity building and technical assistance for fortification
Rwanda 2017–2018	Inform revision of national nutrition policy and strengthen understanding of factors contributing to poor nutrition outcomes, to make a case for appropriate responses	Government used as reference material during the development of the new nutrition policy and the early childhood programme strategic plan WFP used to inform development of internal nutrition policy	FNG credited with shifting thinking on the determinants of malnutrition by government officials, which contributed to a momentum for nutrition-sensitive actions. Also said to have been used to inform development of a strategic plan for early childhood nutrition. Within WFP, there was a reported increase in the consideration and targeting of nutritionally vulnerable target groups in WFP programmes, including school feeding.
Tanzania 2016–2017	Inform the new national nutrition strategy, identify opportunities to improve the nutrition impact of existing WFP programmes and strengthen engagement and shared advocacy activities with nutrition stakeholders	WFP used to inform discussions with government on prioritisation of interventions and to make a case internally for nutrition sensitive actions in WFP programming	Objective of contributing to national nutrition strategy not reported. Within WFP, informed development of country nutrition strategy and prioritisation of nutrition-sensitive actions within existing programmes, such as greater diversification of school feeding menus and local procurement of food for school feeding programmes. The FNG process was also credited for enhanced relationships between WFP and other partners working in nutrition
Ecuador 2018	Inform the integration of a	Government social protection	FNG reported to have helped guarantee a

Table 4 (continued)

Case study location and timing	Objectives of the FNG application	Reported use and users of FNG outputs	Reported influence of the FNG
	nutrition sensitive approach into interventions within a new Government multi-sectorial strategy for child development, especially cash transfers, and ensure that nutrition activities continued to be prioritised	partners used FNG results to advocate for cash transfer amounts that would be sufficient to cover the minimum cost of nutritious diets and Education partners used FNG to make a case for changes to national school meals policy to improve nutritional quality	minimum package of services for families with young children and the incorporation of behaviour change elements into this programme. The FNG also reportedly galvanised commitment for and informed the development of a new school feeding law. The analytical process built capacity and relationships between government and non-government partners involved in technical working group for FNG.
Pakistan 2016–2017	Provide evidence to inform and strengthen advocacy on improving physical and economic access to nutritious foods for nutritionally vulnerable populations within national policy and programmes	WFP staff used FNG to make a case internally and to donors for targeting adolescent girls' nutrition in programming Government technical partners and WFP used FNG to make a case for investments in interventions aimed at improving nutritious food access and targeting nutritionally vulnerable populations, as part of government social protection programmes	Within WFP, FNG was said to be pivotal in the design and successful funding of a new cash transfer programming targeting adolescent girls The FNG contributed to momentum towards addressing malnutrition across the government using multisectoral approaches and influenced landmark government commitment to target nutritionally vulnerable household members participating in a large-scale social assistance programme with specialised nutritious foods, complementing cash transfers.
Sri Lanka 2017–2018	To call government and partner attention to the persistent high burden of malnutrition and advocate for appropriate responses, as well as to inform the review of WFP's country plan	Government incorporated FNG methods into ongoing food and nutrition security monitoring WFP used evidence for advocacy to government on the benefits of including fortified rice in school feeding programmes	FNG said to mobilise multisectoral awareness and support and helped gain greater traction on nutrition issues, as well as building capacity and leading to and institutionalisation of FNG modelling methods within government for monitoring the nutrition situation. Within WFP the FNG contributed to the design of a new regional school feeding strategy.
Myanmar 2018–2019	Inform regional roll-out of national nutrition strategy, specifically the prioritisation of	Development partners used FNG to make a case for nutrition-sensitive approaches in	The FNG informed decision-making and intervention prioritisation during the sub-national roll-out of national

(continued on next page)

Table 4 (continued)

Case study location and timing	Objectives of the FNG application	Reported use and users of FNG outputs	Reported influence of the FNG
Philippines 2018	interventions, by characterising sub-national nutrition contexts and comparing potential of alternative interventions across sectors. Inform regional rollout of the national plan of action for nutrition by highlighting needs and the potential contribution of different programme options in different geographies. Also support efforts to promote food fortification and assist in better understanding determinants of the double burden of malnutrition and inform the development of the WFP Country Strategic Plan	Government partners used FNG to generate greater awareness about malnutrition burden and advocate for nutrition-sensitive social protection WFP nutrition staff used to make the case internally for procurement and use of fortified products in WFP programmes	nutrition plan with local government representatives from different sectors. The FNG was said to be an influential factor in the mobilisation of an inter-government task force on malnutrition and the national government's decision to mandate the use of fortified rice in national food distribution programmes. This was complemented by the decision by WFP Country Office management to incorporate fortified rice into WFP food distribution programmes nationally, to act as a pilot for the eventual government roll-out.
Madagascar 2016	Broad objective of informing government prioritisation of interventions within the new national nutrition plan, using locally specific evidence	WFP staff used to make a case for increasing nutrition workforce and to justify proposals	FNG was said to help consolidate different national actors around topic of fortification, contributing to subsequent increased action in this area. Likewise, within WFP the FNG informed the Country Strategic Plan and was credited with an increase in resources for the WFP nutrition workforce to support nutrition programming and greater incorporation of nutrition-sensitive approaches into existing WFP programmes, such as local procurement of fresh foods for school feeding.
Mozambique 2017–2018	Inform the prioritisation of interventions across sectors to improve nutrition as part of the development of the next national nutrition strategy	Government SUN Coordinator used FNG to inform advocacy for greater resourcing of nutrition actions WFP nutrition staff used FNG in internal advocacy to make a case for more nutrition-	FNG contributed to prioritisation of actions in national nutrition policy and helped promote greater understanding amongst leaders of causes of and appropriate responses to malnutrition. Within WFP programmes, FNG stimulated the inclusion of nutrition targets in school

Table 4 (continued)

Case study location and timing	Objectives of the FNG application	Reported use and users of FNG outputs	Reported influence of the FNG
Niger 2018	Support the development of a new action plan based on national nutrition security policy	WFP used to advocate for increased value of minimum food baskets and school meals and make a case for scale-up of pilot programmes targeting adolescent girls	feeding programme and the introduction of a new programme of gender sensitive food baskets targeting the most nutritionally vulnerable Led to changes in WFP programming, such as the scale-up of a nutrition-programme targeting adolescent girls and improvement to the minimum nutritional content of WFP-supported school meals and food baskets.

areas.

It (the FNG) was more for advocacy. The prevalence of malnutrition, especially wasting was really high but there wasn't enough attention from government. There have been a lot of surveys, like the National Nutrition Survey, the DHS, but no attempt to bring it all together in a compelling way so that there could be action.

WFP-CO 'Broker', Sri Lanka

A few cases had objectives of helping define the nutrition situation and its determinants more broadly, especially where existing data were old or incomplete. Such objectives were commonly secondary to specific policy or advocacy objectives.

The only data that we have on the situation is the National Nutrition Survey. We wanted to know more about food availability, access, and behaviour.

WFP-CO 'Broker', Philippines

We wanted to really move rice fortification forward, expand to stakeholders outside of nutrition, the FNG was an entry point.

WFP-CO 'Broker', Philippines

In all development contexts and some fragile contexts, FNG cases had primary objectives of providing evidence for government decision-making, especially regarding the development of national multi-sectoral nutrition policies. The FNG was also applied to inform the prioritisation of issues and the design of interventions or intervention components during policy implementation or sub-national strategy development. This was particularly relevant when countries lacked resources to implement all elements of a policy or target the entire population, where intervention targeting or specific design choices were needed (e.g. school feeding menu design), or where there was scope to improve upon existing interventions.

We were looking at using it (FNG) to decide on sub-national nutrition plans. We needed data to convince people at the government sub-nationally to get on-board with nutrition and show what works or doesn't work in their areas.

Other UN 'Consumer', Myanmar

Many cases also aimed to inform internal WFP strategy and operations. This was a primary objective in some fragile contexts, where the WFP-led programme portfolio was significant. FNGs aimed to inform nutrition-sensitive adjustments to existing social protection, school feeding, resilience or smallholder production programmes and provided opportunities to engage with and make a case to non-nutrition WFP staff and donors for greater investment in and incorporation of nutrition-

Table 5

Overview of analysis objectives, use and contribution to decision-making, across case studies.

Relevant policy cycle stage ^a	Reasons for applying FNG		Influence or contribution of FNG application	
	Reason	Frequency	Reported influences	Frequency
Advocacy	Inform and strengthen general nutrition advocacy	Primary or secondary FNG objective in some (n = 4) cases. Referred to evidence generation to garner the attention of high-level government decision-makers to encourage action on responding to the burden of malnutrition	Encouraged specific commitments	FNG contributed to advocacy that brought about government commitments to nutrition in a few (n = 3) instances, such as the establishment of a multisectoral body to act on nutrition issues
	Provide evidence to justify or strengthen specific advocacy	Secondary objective in a few (n = 3) cases. FNG conducted to strengthen existing advocacy efforts (e.g., advocacy for mandatory fortification or need to address nutritional vulnerability of specific populations)	Built momentum for key issues	Often (n = 6 cases), issues highlighted by the FNG findings, such as nutritional vulnerability of adolescent girls, gained momentum and contributed to an enabling environment for programme and policy responses
Situation Assessment	Characterise the nutrition situation	A few (n = 3) FNG applications aimed to characterise and understand factors contributing to malnutrition across the case study country, especially when there were limited secondary data available, where challenges such as double burden were emerging and where there was significant subnational diversity in vulnerability	Improved understanding and changed thinking	FNG credited for improved understanding of malnutrition determinants in almost all (n = 8) cases, especially among key policymakers. Helped shift views that poor nutrition is caused by issues with knowledge and behaviour to an appreciation of the factors that affect access to nutritious diets. Contributed to a more enabling environment and appreciation of the potential other systems to play a role in improving nutritious diet access, moving from a 'treatment' to a 'prevention' view
Prioritisation	Inform government policy development	Primary objective in most (n = 7) cases. Aim to provide evidence to assist prioritisation of nutrition and actions that could impact nutrition, especially during national nutrition or food security policy development	Informed national nutrition policy	FNG occasionally referenced in policy (n = 2 cases), as justification for decisions or to demonstrate need. In other cases (n = 3), FNG said to have broadly 'informed' policy. Occasionally this objective was not met, but FNG was used and contributed in other ways
	Inform internal policy	Aim of informing internal policy development in the form of WFP country strategic plans, in some (n = 4) cases, to better embed nutrition into WFP programmes. Mostly secondary to government policy objectives	Inclusion of nutrition in WFP policy	FNG recommendations featured in all targeted (n = 4) WFP Country Strategic Plans. Credited for greater prioritisation of nutrition-sensitive actions across programme areas.
Policy or programme review, development, and planning	Inform government strategy or programme design	Primary objective in almost all (n = 8) cases. Aim to provide evidence to assist prioritisation of nutrition actions, geographies and target groups during strategy development or implementation	Informed design of sector-specific and subnational actions	Often (n = 6 cases) used to identify, prioritise or design actions by individual government ministries; e.g. prompting review of school feeding legislation or including a targeted fortified food for to a social protection transfer. In a few cases FNG informed discussions for sub-national strategy development
	Inform internal programme decisions	Primary or secondary objective in some cases (n = 4), especially fragile contexts. Aim to inform or make a case for incorporation of actions to better address poor nutrition across WFP programmes	Contributed to more nutrition-sensitive WFP programming	Led to nutrition sensitive changes to WFP programmes in almost all (n = 9) cases, e.g. school meal design, transfer values, or, occasionally new programmes planned to target groups or actions prioritised by FNG
Resource Allocation	Justify requests for resource allocation	Secondary objective for very few (n = 2) FNGs, responding to need for evidence to review or justify decisions on resource allocation and requests	Helped make a case for and secure funding	FNG used to appeal to donors and make a case for specific programme approaches in a few (n = 3) cases and, occasionally credited with programme changes or new programmes being funded
Evaluation	Demonstrate value of current programmes	Secondary objective in very few (n = 2) cases where there was limited baseline data available. FNG used to model scenarios with and without current WFP interventions to make a case for their continuation	Justified existing programme approaches	In one case FNG was deemed crucial for ensuring that government funding for a nutrition programme was not cut, in a few (n = 2) others it was helpful to convince donors of the appropriateness of existing programme approaches

^a Due to the FNG's relevance to and engagement with multiple sectors responsible for nutrition improvement (health, social protection, agriculture, education, etc., policy areas and programmes, some FNG applications were simultaneously applied across multiple policy cycle stages.

sensitive programming approaches.

We thought it (FNG) could trigger internal discussions that would help us more clearly articulate WFP's role to address stunting in this country, in addition to addressing food insecurity.

WFP-CO 'Consumer'

Once we'd learnt about what it (the FNG) entailed, we thought it could give us a more comprehensive idea about or trigger discussions that would help us to more clearly articulate a strategy on what WFP's role could be to address stunting in this country.

WFP-CO 'Consumer', Sri Lanka

A few FNG cases also had secondary objectives of informing resource allocation and funding proposals within WFP programmes or showing the value of current programmes. Such examples included a request for evidence to inform the review of cash transfer values in refugee camps following an increase in local food prices. The FNG was considered an avenue for making decisions and justifying resource allocations or requests to donors and internally.

In the last quarter we saw a lot of food price increases. We are discussing a transfer value increase of 12%. It's not that much but we still had to justify this with donors. We planned to show them the FNG results, triangulated with the new data on food prices.

WFP-CO 'Consumer', Rwanda

3.3. Use and users of the FNG outputs

Across case studies, the FNG was presented or quoted during discussions about programme or policy decision making and applied to trigger or reinforce advocacy for the prioritisation of vulnerable groups, resource allocation, and to encourage nutrition sensitive programme approaches. The reported uses of the FNG outputs, as presented in Table 4, differed by end user type (see Fig. 2), their affiliation and their country context.

3.3.1. By end user group

'Broker' and 'technical analyst' end users were more likely to report using the FNG outputs for advocacy; to raise awareness about the need for a response to the nutrition situation or the vulnerability of particular groups or geographies and to encourage other sectors (social protection, health, agriculture, etc.) to adopt or further invest in nutrition-sensitive approaches to their programmes. 'Consumer' end users often reported direct application of the FNG to decisions when developing or adjusting existing programmes or policy.

In a few cases, end users felt the FNG was not used as well as it could have been. Some 'technical analysts' were concerned there were not clear 'next steps' for the FNG process once the results had been disseminated. Additionally, a few consumer end users were uncertain as to who was responsible for ensuring that the FNG outputs were effectively used. Insufficient use was attributed to gaps in capacity to translate evidence into advocacy messages, as well as general lack of necessary person time (government and non-government) to engage and take on this role. Some respondents recommended that roles and responsibilities of different stakeholders be more clearly defined in future FNG applications.

The TWG members from our department and other government units, they were really committed and did the work (for the FNG), but they are technical staff, they conduct assessments, they are not used to taking this to a policymaker and saying, 'because of this evidence, this change is needed'. It's a real gap and I don't know what to do.

Government 'Consumer', Mozambique

3.3.2. By end user affiliation

There was a difference in reported use of FNG outputs by respondents from WFP and respondents from government and other non-government organisations. WFP staff cited FNG results during government policy discussions as members of advisory committees or working groups or where the government had requested technical support. In a few cases WFP nutrition staff used the FNG to advocate for specific actions or issues when meeting with government partners or to justify funding requests or programme approaches to donors. More commonly however, WFP nutrition staff used the FNG to make a case internally to encourage staff from other programme areas, such as cash-based transfers or school feeding, to make their programmes more nutrition sensitive.

Government respondents reported using FNG outputs as an evidence source for their own policy development processes. Additionally, some technical government staff used the FNG to advocate to policymakers within government, stating it was useful to triangulate existing evidence or present the argument for addressing malnutrition in a new way, using economic access rather than health outcomes to make a case.

People were not surprised by the (FNG) results. Most adolescent girls do not eat enough because they eat with the women, the good part of meals is given to the father. We need to do more for these girls to be able to increase their nutrient intake. Since this (FNG) the government has begun pushing on this.

Government 'Consumer', Niger

With the exception of one person, respondents representing NGOs and UN organisations other than WFP described their involvement in the FNG as supporting the process 'overall' and shared their perceptions about how others used the FNG and the influence it had (or did not have), rather than reporting using the FNG outputs themselves. The one respondent from this category who reported direct use of the FNG did so through a policy support activity that was done in collaboration with WFP.

3.3.3. By end user location

There were differences in the reported use of the FNG outputs by country context. In fragile contexts, the general availability of recent data on the nutrition situation for different population groups and factors contributing to this was limited, with little to no subnational disaggregation possible. As such the FNG was welcomed for its ability to help fill evidence gaps and help inform needs assessment and resource prioritisation. There were some reports of the FNG being applied to government decision-making, or advocacy for government decision-making in fragile contexts, especially when government partners were involved throughout the FNG process. Otherwise, the use of the FNG to inform WFP programmes was very common in fragile contexts, likely as WFP has large operations in these countries.

It (FNG) showed the economic benefits of providing more nutritious school meals and linking with activities that could also provide income for the local community. Now what happens is we're supporting small live-stock and vegetable production and part of the food produced from the homestead is used in the school meals.

WFP-CO 'Broker', Niger

Use of the FNG by government partners for advocacy was more common in development contexts, potentially due to the capacity and time needed for these activities (as discussed further in section 3.3). In many of these cases, the FNG had been conducted in response to government requests for evidence generation to support advocacy.

In the Department of Education, we really took these (FNG) messages into account. The School Feeding programme is just for 8-12-year-olds at the moment, so would need to change to cover (the nutritional needs of) adolescent girls. We wanted to change the plan of action to include this group in the education and health activities. We've been fighting (internally) for this using the FNG.

Government (SUN) 'Consumer', Philippines

3.4. Contributions to decision-making

Situation analysis, diet modelling and intervention modelling elements of the FNG were valued by government and non-government respondents for bringing together existing data to characterise the nutrition situation, spotlight relevant issues and explore the potential contribution of different interventions. Government respondents remarked on the usefulness of the FNG to demonstrate how simultaneous actions across different sectors could influence the cost and affordability of nutritious diets. The ability to show the need for and potential contribution of interventions by target group or geography was highly valued, especially by respondents in fragile settings where the availability of disaggregated data was limited.

3.4.1. Encouraged specific commitments

A few 'consumer' and 'broker' informants claimed the FNG had been a catalyst for increased government attention and commitment to nutrition in general, such as the inclusion of nutrition in a national development plan or announcement of a task force on malnutrition. In some cases, this was attributed to the FNG being shared 'at the right time' and in others through sustained advocacy messaging and actions that made use of the FNG as an evidence source (amongst other evidence

sources).

The Cabinet Secretary announced at the (FNG) dissemination meeting, based on this momentum from the FNG, they would develop a partnership against hunger and poverty between government departments.

Government ‘Consumer’, Philippines

3.4.2. Built momentum for key issues

Frequently, issues or policy options highlighted in the FNG were said to have gained momentum and be spoken about more by stakeholders after the analysis. An example was a noted increase in discussion about the topic of potentially introducing mandatory large-scale food fortification. This stopped at the generation of momentum for some examples. For others an increase in policy and programming responses (government and non-government) to the prioritised issues were noted. An example was the introduction of programmes targeting adolescent girls, whose nutritional vulnerability had been emphasised by the FNG findings.

It (the FNG) really helped us to put fortification on the national agenda again. There was a working group, but this was really a bunch of nutritionists who spoke among themselves. they hadn't been able to take it to next level and this (the FNG) really got things moving.

WFP-CO ‘Broker’, Philippines

3.4.3. Improved understanding and changed thinking

Some respondents thought the FNG was also helpful for overcoming misconceptions about the causal factors of malnutrition. This was said to help shift perceptions on actions needed to address malnutrition (e.g. interventions addressing structural and economic barriers rather than only behavioural barriers to nutritious diets). This impact was magnified in contexts where the FNG presented explanations that differed from how malnutrition was commonly understood, for example where undernutrition, overweight and obesity were seen as resulting from failings in the knowledge and behaviour of affected individuals and their families.

Especially on the government side and even in civil society, it (the FNG) helps combat this misconception that people have enough food but they don't know what to eat ... it proves people don't eat properly because they can't afford the foods that they need. It's very powerful.

Government ‘Consumer’, Mozambique

Additionally, many respondents felt the FNG improved general understanding and acceptance of the factors that contribute to malnutrition, especially amongst government stakeholders from non-nutrition backgrounds. The use of economic data on food price and expenditure to estimate nutritious diet affordability reportedly fostered understanding of the concept of nutrient gaps. Some ‘consumers’ felt this helped facilitate discussions about nutrition-sensitive policy and programme responses across sectors. In this way, the FNG was credited with contributing to momentum for nutrition policies and programmes that incorporated social protection, education, health, agriculture and food systems as part of the solution, as well as the eventual incorporation of nutrition in policies from these other sectors.

People were like ‘oh really?’ It was another way of understanding there are issues with access to nutritious food. The social protection sector, the government, got evidence to understand how this (access to nutritious diets) is important in their work.

Government ‘Consumer’, Tanzania

3.4.4. Informed national nutrition policy

In some cases, according to both government and non-government participants, FNG results informed national nutrition policy. Specific FNG influences were apparent in some policies, for example in the

justification of geographical prioritisation and the inclusion of nutrient-dense foods in government distribution programmes, otherwise the FNG was said to have been generally influential during policy development or review processes.

The third national strategy on Food Security and Nutrition includes FNG data in the background, to explain why nutrition is so important and introducing the action points for different sectors.

Government ‘Consumer’, Mozambique

The new national nutrition plan really reflects the FNG. It has a granulation of special nutritious foods, for the first time it includes rice fortification as a main strategy, and it has different intervention types for different areas.

WFP-CO ‘broker’, Madagascar

Contributions to policy decision-making were not reported in all cases where informing government policy development was a primary FNG objective. Factors raised as having contributed to this included the timing of FNG finalisation not aligning with the nutrition policy cycle, staff turnover within government departments, political change, a lack of understanding of FNG methods or results by intended ‘consumer’ end users, capacity to communicate the FNG for policy translation and insufficient resources to put recommended changes into action. For these reasons, the FNG was considered by a few respondents, both internal and external to WFP, to have been a ‘missed opportunity’.

3.4.5. Contributed to more nutrition inclusion in WFP policy

In all relevant cases, FNG recommendations were incorporated into country-level WFP policy documents, including country strategic plans and nutrition policies. The FNG was said to have encouraged a greater inclusion of or reference to nutrition-sensitive actions in internal policy, especially for non-nutrition programmes such as social protection or school feeding.

There's now (after the FNG) a special outcome in the Country Strategic Plan that directs capacity building and technical assistance with the government for fortification.

WFP-CO ‘Broker’, Tajikistan

3.4.6. Informed sector-specific or subnational actions

Occasionally, participants shared that the FNG informed government decision-making at the sub-national level, reportedly assisting in making a case for nutrition actions to subnational non-nutrition stakeholders and supporting the prioritisation of multisectoral responses. This included decisions on which populations to target with interventions, as well as decisions during the design of interventions themselves.

We used it (FNG) to prioritise the provinces for the government to work in more intensively.

Government ‘Consumer’, Philippines

The FNG assisted the regional decision-makers prioritise nutrition interventions across sectors, complementing the national plan.

WFP-CO ‘Broker’, Myanmar

In some cases, the FNG was influential in decisions about sector-specific actions to improve nutrition. This included the introduction or modification of laws or regulations on fortification and school feeding and the incorporation of nutrition-sensitive elements into large-scale government social-protection programmes. FNG ‘influence’ mentioned by participants ranged from contributing evidence to policy discussions to acting as a ‘catalyst’ for change. In one case, the FNG, delivered as part of a broader advocacy effort, contributed to a government decision to incorporate nutritious food transfers into a large-scale, government-led cash transfer programme. In another example, government respondents felt the FNG helped facilitate discussions that led to a change in the food and micronutrient content standards for school meals.

The (FNG) analysis was crucial in the (government) decision to include fortified rice in the school feeding programme, that's now being rolled out nationally.

Government 'Consumer', Sri Lanka

With school feeding they are revising the law and it's about what food can and can't be included now. There were a lot of observations about the use of fresh foods, as well as processed foods that weren't so healthy in this, a lot really came from the FNG.

Government 'Broker', Ecuador

Many government consumers reported applying the FNG in new or ongoing advocacy, either within their own ministry or department or aimed at other sectors. Technical government respondents or SUN co-ordinators responsible for advising elected officials on nutrition issues applied the FNG to make a case for specific nutrition actions or resource allocation. This was more common in development contexts, potentially due to the capacity and time needed for sustained advocacy.

We (technical team) have used it (the FNG) for internal advocacy. Meeting nutrient requirements (for a household) would cost more than \$8 per day, but what we are giving households in the basic goods basket is based on just \$2.50 per day. This would cover calorie needs but considering we have a double burden of malnutrition, just giving calories is not enough. This is good timing as the government is considering an increase to the transfer value in the light of COVID.

Government 'Consumer', Ecuador

3.4.7. More nutrition-sensitive WFP programming

WFP respondents (mostly nutrition staff) used the FNG to make the case for more nutrition-sensitive programming approaches, which led to programmatic changes in some cases. This included sharing evidence from the FNG to demonstrate the potential nutritional benefits of including fresh local foods or fortified food in transfers and school meals and increasing cash transfer values. The FNG was deemed important for helping convince non-nutrition WFP staff (logistics, procurement, supply chain) of the merits of programming approaches that could otherwise be viewed as difficult or costly (such as distributing fresh eggs, procuring fresh vegetables for school meals from local producers, encouraging the local production of fortified foods and incorporating food vouchers or supplements into ongoing programmes).

The use of micronutrient supplements in the school feeding – that was actually already the case, so the FNG didn't change what was being done but it meant we kept doing it, we could show the logistics and procurement team that it was worth the effort and also demonstrate value to the donors and stakeholders.

WFP-CO 'Consumer', Madagascar

In a few cases new programmes or programme elements were introduced. More commonly, existing programmes were adapted to improve nutrition sensitivity, such as by reformulating menus or including fortified products to improve the nutritional content of school meals, incorporating more nutritious foods in food baskets, and reviewing cash transfer values. WFP nutrition respondents found the FNG especially helpful for talking to colleagues from other units about the value of adopting or continuing to incorporate nutrition-sensitive programme elements.

We used it to figure out how to do adolescent programming. It let us look at what the different options are and explore entry points and avenues. It's really supporting this global push on adolescent nutrition. It showcases this vulnerability but then also models potential interventions, this is incredibly valuable for our work.

WFP-CO 'Consumer', Tanzania

3.4.8. Helped make a case for and secure programme-specific funding

Occasionally WFP staff used the FNG results to appeal to donors for the funds or approval needed to implement nutrition actions or programmatic changes recommended by the FNG results, for example increasing cash transfer amounts. WFP respondents shared that the FNG had provided compelling evidence that resonated with development partners and donors on the vulnerability of certain populations and the potential for selected interventions to improve nutritious diet access. In a few cases this was considered pivotal in the success of requests for funding increases or funding for new programmes.

We had a small programme to encourage vulnerable adolescent girls to stay in school. This activity was already going on, but the FNG led to us expanding with funds from a new donor.

WFP-CO 'Broker', Niger

3.4.9. Justified programme approaches

Lastly, a few WFP respondents reported using the FNG to justify and show the value of current programme approaches, especially in contexts where little baseline and midline data were available. This was credited with the continued prioritisation and funding of the featured programmes in the corresponding cases. In one case, instead of drawing attention to unaddressed issues or recommending new actions, the FNG helped government partners validate existing policy and defend allocated resources in situations of austerity or budget cuts or ensure appropriate attention from finance or other ministries.

One thing we're asking is 'does it make sense to use cash for nutrition here?'. Some of our donors assume it would be easier and cheaper, but what we can show with FNG is that it may be hard to meet nutrient needs with the foods that are available on the market, and it could be cheaper and actually more effective to give SNF.

WFP-CO 'Broker', Rwanda

4. Discussion

The FNG has been applied to inform and strengthen advocacy and decision-making for improved nutrition commitments and nutrition-sensitive policy and programming in diverse country contexts. The study findings highlight diverse policy decision-making and programme influences the FNG has had, as well as the contributions to improved partnerships, awareness, understanding and momentum for nutrition across sectors.

These findings resonated with other studies evaluating the application and use of similar nutrition modelling tools. Stegmüller et al. found that the Lives Saved global health modelling tool (LiST) has generally been used, often by international partners, as well as by national governments to inform advocacy and strategic planning, usually through generation of evidence to assist government prioritisation health interventions and actions (Stegmüller et al., 2017). In the NMC evaluation the 12 nutrition modelling tools were mostly applied by international organisations to inform government decision-making. The tool applications examined contributed to greater enabling environments for nutrition and, in most cases, influenced programme and policy design, however opportunities for strengthening these contributions were identified (Knight et al., 2022). Similarly, not all FNG applications examined achieved their primary objectives, often for reasons associated with how and when the results were disseminated and the capacity of local WFP staff and government partners to understand and further disseminate these results. As raised by respondents of this analysis, Michaud-Létourneau et al. recommend that evidence-generation and advocacy activities within nutrition include activities to build capacity around how to apply evidence, such as the FNG, at different policy cycle stages (Michaud-Létourneau et al., 2019a). Pelletier et al. also suggest that national government departments and international organisations

providing technical assistance for nutrition, invest in the necessary staff capacity to translate and apply evidence to policy discussions and advocacy (Pelletier et al., 2017). As such, building capacity to apply evidence may be more pertinent in some contexts than building capacity for evidence generation (Michaud-Létourneau et al., 2019a). This said, in a systematic review on using evidence to influence policy, Oliver and Cairney recognise the complexity of the many tasks associated with influencing policy, which suggests the capacity requirements may be significant (Oliver and Cairney, 2019).

In evaluating the contribution of evidence generation and advocacy efforts to improve child feeding policies in Southeast Asia, Michaud-Létourneau et al. identify how the outputs of such activities ultimately combine to achieve progress towards policy change (Michaud-Létourneau et al., 2019b). This progress was achieved by the use of evidence to contribute to a) agenda setting and b) bringing together a strategic group of actors on key issues to c) keep the issue on the agenda, d) support government partners with critical tasks and e) extend commitment (Michaud-Létourneau et al., 2019b).

This study did not consider the impact of policy or programming changes on nutrition outcomes. Schaffer argues that policies can only be deemed successful if they result in changes on the ground, once implemented (Harris et al., 2017a; Schaffer, 1984). However, Harris et al. argue, using the example of nutrition policy evolution in Zambia, that increased political attention and policy for nutrition has led to concrete action, especially where international and local funding has followed (Harris et al., 2017a). The FNG can contribute, along with other evidence generation activities, to a fluid ecosystem of evidence generation, capacity building and advocacy that results in enabling environments for policy focused on nutrition improvement (Gillespie et al., 2013; Harris et al., 2017b; Knight et al., 2022; Lamstein et al., 2016). As such, it is important to consider how the FNG fits or could fit into existing evidence and advocacy ecosystems, from national and local governments and development partners (Knight et al., 2022). For this reason, the FNG should be nested within existing advocacy efforts aimed towards strategic policy change at relevant policy cycles, while also ensuring that opportunities for unplanned or serendipitous application of the FNG results and recommendations are sought and capitalised (Lin, 2008).

This study has demonstrated that the FNG can be applied to multiple country contexts for different objectives and be used to inform nutrition decision-making for government and non-government policy and programmes across sectors. The FNG offers a flexible format and approach, in terms of analysis focus and how the analysis is done, that can be tailored to the needs of partners and relevant policy cycles. These findings also demonstrate that the FNG outputs can be applied for different uses and outcomes, from large-scale advocacy and policy development to individual programme decisions. Importantly, this study demonstrates the ability of the FNG approach to bring together and make nutrition relevant to stakeholders from multiple sectors, including education, health, and social protection, which is essential for meaningful action towards improving nutrition outcomes (Klemm and de Pee, 2019; Lamstein et al., 2016).

The strengths of this study are the comparison of FNG cases from 11 countries across seven geographical regions, representing diversity in terms of development and fragile contexts, analysis objectives and processes. The sampling aimed to draw on the experiences of broker, analyst and consumer FNG users from government, WFP and partners, enabling findings to be triangulated across respondent types and affiliations.

Nonetheless, some limitations to the study design should be acknowledged when interpreting the results. Sampling and response bias are possible as using snowball sampling; informants involved in the FNG may have tended to identify participants they thought would speak positively about the FNG which could limit the range and experience of stakeholders interviewed. Similarly, respondents who were more engaged or had a positive experience with the FNG may have been more

willing to participate than those who did not. Despite a deliberate effort to ensure external representation in the sampling, 50% of respondents were WFP staff or WFP-affiliated. In many cases these included individuals who were targeted 'consumer' end users of the FNG, such as WFP country-office management or staff from teams targeted for nutrition integration, such as WFP Social Protection, Supply Chain and School Feeding staff. Nonetheless, this reflects a greater engagement from those internal to the organisation and may have resulted in either a more favourable impression of the FNG process or impact or a more WFP-centred view of the FNG's contribution.

Interviews and analysis were conducted by one team member, the lead author, who is WFP affiliated. While external partners from the Nutrition Modellers Consortium and LSHTM were involved in the design and review of methods and the analysis and efforts were taken to remain impartial during these activities, some bias is possible. Also, as RTA was used for the qualitative analysis, the development of themes was influenced by the background and knowledge of the lead author and other team members and may have been different if conducted by other people (Braun and Clarke, 2019).

Response bias is possible as participants may have been reluctant to speak about elements of the FNG process or results that they were not satisfied with. It is also possible end users exaggerated the impact of FNG activities that they were involved in. However, some interview participants were very forthcoming about perceived shortcomings in the FNG or FNG process, and by speaking to multiple respondents from different end user groups and affiliations in each country, it was possible to triangulate and identify areas particularly vulnerable to bias.

5. Conclusion

The FNG situation analysis has been used to inform nutrition advocacy and decision-making in LMICs, which, in turn, have contributed to enabling environments for nutrition action across different sectors. The flexibility of the FNG approach allows application to diverse country settings, across all stages of the nutrition policy cycle and with nutrition-relevant partners from different sectors. A key part of this application has been continued efforts to build understanding and capacity for evidence generation and evidence application to decision-making. The FNG is a useful tool to support national-level efforts to improve nutrition, and relevant to government and non-government partners, as well as within WFP.

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CRedit authorship contribution statement

Frances Knight: Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft. **Jane Badham:** Conceptualization, Writing – review & editing. **Helen Walls:** Conceptualization, Methodology, Writing – review & editing. **Nora Hobbs:** Conceptualization, Methodology, Supervision, Writing – review & editing. **Saskia de Pee:** Conceptualization, Funding acquisition, Methodology, Supervision, Writing – review & editing.

Declaration of competing interest

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Data availability

The data that has been used is confidential.

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