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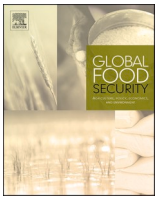

Advancing knowledge about stakeholder engagement in multisectoral nutrition research

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ABSTRACT

Strategies to engage stakeholders increase the relevance of multisectoral nutrition research but are challenging to embed within research programs. Drawing from fifteen food choice studies, the aim of this study was to understand the diversity of strategies that researchers used in engaging with stakeholders to synthesize lessons learned from their experiences. Researchers developed and implemented a wide range of strategies that varied in terms of extent of collaboration sought. Informational strategies were used to increase stakeholder buy-in and generate demand for results. Collaborative strategies were more integral to the production of knowledge and were used in framing research significance, interpreting results, and finalizing recommendations. Researchers developed strategies of varying intensity depending on goals for uptake. This research sheds light on the role of stakeholder engagement in advancing multisectoral nutrition. Findings may aid researchers in constructing engagement strategies that are responsive to complex multisectoral nutrition landscapes in low- and middle-income countries.

1. Introduction

While the prevalence of all forms of undernutrition has declined in most low- and middle-income countries (LMIC) over the past decade, 22% of all children are currently stunted and nearly 8% are wasted. Nearly one third of women are anemic, and close to 10% of adult women and 6% of adolescent girls are underweight. Progress in reducing the prevalence of all forms of undernutrition varies greatly within countries and by wealth quintile (Fanzo et al., 2018). Concurrently, obesity rates are increasing globally. Nearly 40% of LMIC are experiencing a double burden of simultaneous under- and overnutrition, raising urgent questions about the capacities of healthcare systems to address substantial burdens of both communicable and non-communicable disease (Popkin et al., 2019). Additionally, the need to incorporate environmental sustainability principles into nutrition and food security solutions from both a production and consumption perspective is increasingly recognized within global nutrition research and practice communities (Willett et al., 2019).

Given the complexity of both the nutrition challenges and proposed solutions, decision-makers acknowledge that population-level improvements in nutrition in LMIC require coordination of policy and programmatic efforts across multiple sectors to address the determinants of malnutrition as well as concerns regarding environmental sustainability (Fanzo, 2014; Scaling Up Nutrition, 2016). In response, a growing body of literature in global nutrition promotes specific policy actions to improve nutrition and highlights evidence gaps (e.g., Gillespie et al., 2018). Recommendations and evidence generated through research may not align with country capacities for uptake and implementation, however, thus hindering progress in addressing malnutrition (Jerling et al., 2016). In light of this bottleneck, researchers, funders, and policy and implementing institutions view stakeholder engagement as a way to facilitate timely use of evidence and increase the feasibility of research recommendations (Fazey et al., 2014; Goodman and Sanders Thompson, 2017; Mallery et al., 2012; Oliver et al., 2018; Peters et al., 2017).

Stakeholders are "individuals, organizations, or communities that have a direct interest in the process and outcomes of a project, research, or policy endeavor (Deverka et al., 2012, p.5)" Stakeholder engagement is "an iterative process of actively soliciting the knowledge, experience, judgment, and values of individuals selected to represent a broad range of direct interests in a particular issue, for the dual purposes of creating a shared understanding [and] making relevant, transparent and effective

Abbreviations: DFC, Drivers of Food Choice; LMIC, Low- and middle-income countries.

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decisions" (Deverka et al., 2012, p.5). Stakeholder engagement, particularly efforts oriented to collaboration and building relationships, can improve research quality and relevance (Boaz et al., 2018; Forsythe et al., 2016; Phillipson et al., 2012). Building relationships with stakeholders also helps researchers to gain insight into policy windows (Cullerton et al., 2016a). A growing body of scholarship on research engagement in policy processes is helping to elucidate the complexities of policy processes and implications for research and stakeholder engagement in international nutrition and food systems (Cullerton et al, 2016a, 2016b, 2018; Nisbett et al., 2014; Walls et al., 2020) and more broadly (Cairney and Oliver, 2020; Oliver and Cairney, 2019; Shiffman and Smith, 2007).

The emphasis on stakeholder engagement for research impact on policy and/or practice is not a recent phenomenon—it has been a feature of a number of applied fields going back several decades (Oliver and Cairney, 2019)—but research and practice communities in health sciences, education, and environmental sciences among others are driving a closer examination of the dynamics of engagement for research impact and surfacing key questions. For example, the articles in the 2019 edited volume of IDS Bulletin entitled "Exploring research-policy partnerships in international development" present diverse examples of global research partnerships to advance dialogue within research and practice communities about what constitutes an equitable, effective partnership between research and non-research stakeholders (Georgalakis and Rose, 2019a). Others have examined the ethics and goals of participatory engagement strategies to improve research uptake (e.g., Boaz et al., 2018; Forsythe et al., 2016; Goodman and Sanders Thompson, 2017; Oliver et al., 2019; Theobald et al., 2018). Researchers are also challenging expert and/or northern-centric problem framings and models for stakeholder engagement, most notably the ways in which the concepts of equity, benefit, and impact are interpreted and applied (e.g., Chambers, 2017; Cornwall and Brock, 2005; Georgalakis and Rose, 2019a,b; Goodman and Sanders Thompson, 2017; Harris and Nisbett, 2020; Ishengoma, 2016; Jolibert and Wesselink, 2012; Melber, 2019; Morse and McNamara, 2006; Newman et al., 2019; Sen et al., 2017; Shackleton et al., 2019).

A donor's stance on what constitutes research impact is an important driver of decision-making around how, when, why, and with whom researchers engage (Gwyther, 2014; Phillipson et al., 2012). Given the broad-based nature of donor investments in research, donor stance can influence how stakeholder engagement occurs across a wide range of sectors. In international development, the UK's Foreign, Commonwealth & Development Office (formerly Department for International Development) emphasized research investments achieving "instrumental" forms of research impact (Gwyther, 2014), which Georgalakis and Rose (2019b, p.2) define as "impacts on policy and practice" and/or "a change in direction attributable to research."

Stakeholder engagement for instrumental impact can be parsed into two broad classes: engagement for decision-making and engagement in knowledge production (Oliver et al., 2018). Stakeholder engagement for decision-making facilitates decision-making informed by evidence, i.e., researchers engaging with stakeholders specifically around the use of evidence. Engagement in knowledge production is about the production of evidence; in this case, stakeholders may be engaged to contribute to the research process in some regard (e.g., framing research questions, interpreting results, or acting as participants themselves). Within each class, engagement may be sought with any stakeholder depending on the specific goal of engagement. Engagement strategies vary by the level of collaboration sought—that is, some goals accord less or more decision-making power to stakeholders (Forsythe et al., 2016; Goodman and Sanders Thompson, 2017). Less collaborative engagement may be referred to as "uni-directional", wherein the communication is driven by the research team and the purpose is primarily to inform stakeholders. More collaborative engagement may be referred to as "bi-directional", wherein dialogue is sought with stakeholders, typically to inform researchers' decision-making with higher degrees of influence accorded to stakeholders (Jolibert and Wesselink, 2012).

Whether for the purpose of decision-making or knowledge production, stakeholder engagement strategies can be challenging to embed within research programs. Beyond the difficulty of identifying relevant stakeholders, engagement requires an in-depth understanding of the study context's enabling environment in order to identify possible champions, opportunities to align research activities with stakeholders' strategic priorities, and institutional windows of opportunity (Cullerton et al., 2016b; Gillespie et al., 2015). Researchers must tailor their engagement strategies to accommodate both in-country policy processes (Breton and De Leeuw, 2010; Oliver and Cairney, 2019) and stakeholders' characteristics, such as their implementation capacity and needs for and use of evidence in decision-making (Lamstein et al., 2016; Pelletier et al., 2012). Not least among these considerations, researchers must identify feasible strategies within their constraints of personnel, time, money, and relative influence (Forsythe et al., 2016; Jolibert and Wesselink, 2012; Phillipson et al., 2012). Beyond these challenges, the field of global nutrition presents several distinctive challenges for effective engagement. Due to the diversity of actors and interests represented in global nutrition, both identifying relevant stakeholders and engaging with stakeholders in decision-making is far from straightforward (Cullerton et al., 2016a, 2018). Furthermore, many countries have developed multisectoral nutrition strategies, but their ability to implement these strategies varies widely (Jerling et al., 2016).

In this manuscript, we review the stakeholder engagement strategies within a portfolio of 15 international food choice studies that took place in 2 rounds across 10 LMIC from 2015-2020. The Drivers of Food Choice (DFC) Competitive Grants Program was established with funding from the Bill & Melinda Gates Foundation and the UK Government's Foreign, Commonwealth & Development Office to advance understanding of food choice and its myriad implications for nutrition and well-being among vulnerable groups in LMIC. Funded projects aimed to understand drivers at the individual level as well as the economic, policy, cultural, and environmental drivers present within food environments and food systems. As a condition of the grants program, researchers drew upon the experience of their teams and knowledge of research settings to develop multilevel and multisectoral stakeholder engagement strategies with the explicit goal of achieving instrumental impact, i.e., demonstrable uptake of the research findings in policy and/or programmatic settings. We aimed to understand the diversity of strategies that researchers used in meeting this condition to synthesize lessons learned from their experiences. To achieve this aim, we answered four research questions: 1) how did researchers identify stakeholders with whom engagement was critical to improve the likelihood of research uptake? 2) what strategies did researchers use to engage with different stakeholders and why? 3) how did engagement strategies vary in timing and intensity? 4) in what ways did a researcher's positionality influence their engagement strategy? Mapping the answers to these questions with target stakeholders and rationales for each strategy provided an opportunity to identify patterns of engagement for the purposes of both knowledge co-production and evidence-sharing. This manuscript contributes a granular view of the relationships between academics and non-academic stakeholders that are formed to achieve instrumental research impact and highlights opportunities to both establish and deepen research partnerships within the time and resource constraints relatively typical of shorter-term research projects.

2. Methods

The participants for this study were researchers involved in two-year research projects funded by the Drivers of Food Choice (DFC) Competitive Grants Program. Funded projects were located in 10 LMIC in Sub-Saharan Africa and South and Southeast Asia: Malawi, Guinea, Tanzania, Uganda, Kenya, India, Indonesia, Vietnam, Nepal, and Ghana. Collectively, the 15 study teams represented 21 academic, research, and non-governmental institutions. The majority of projects were co-led by

investigators based at research, academic, and/or non-governmental institutions in the US and Europe in close partnership with investigators based at similar institutions located in the study country.

Investigators were required to include in their full proposals stakeholder engagement strategies for the purpose of facilitating research uptake in policy and programmatic settings as well as benchmarks to evaluate the success of each engagement strategy in facilitating uptake. No specific guidance or standards were given for this activity in the full proposal guidelines, and researchers were invited to develop strategies appropriate to the context and topic as well as the capacities of the study team. Stakeholder engagement strategies were reviewed by the management team as part of the full proposal.

2.1. Data collection

Data consisted of project proposals, annual reports and other routine reporting activities, and interviews with the principal and/or co-principle investigators of each of the 15 projects in the DFC research portfolio (n = 15). Interviews were conducted as part of routine monitoring and management activities by the lead author, who was a member of the management team. Interviews served the dual purpose of assessing progress towards goals for stakeholder engagement and identifying additional needs for support. As such, the lead author requested interviews with principle investigators and any co-investigators who had substantial involvement in the development and/or implementation of the stakeholder engagement strategy. The majority of interviews were conducted with PIs, who, as the primary coordinators and points of contact for each grant, were tasked with managing reporting activities, leading communication with the management entity, and representing the activities, perspectives, and concerns of the full study teams. Interviews were conducted over a nine-month period from January to September 2019. About half of the interviews took place near to or just after completion of the 2-year research projects and the other half of the interviews were completed close to month 12 of the 2-year research projects. The lead author also sought updates and verification of details as needed from researchers during routine monitoring and reporting activities (e.g., update calls, in-person meetings at conferences), which typically continued after the completion date of a given project. Interviews were conducted by the first and second authors, audio recorded with permission of the interviewee, transcribed and uploaded into NVIVO 12. Interviews typically lasted 1 h. All of the authors have expertise in qualitative data collection and analysis.

Interviews were semi-structured. Topics covered in each interview included: a) descriptions of stakeholder groups and the process used by the study team to identify them; b) which strategies grantees used or planned to use to engage stakeholders at inception, during the study, and at dissemination; c) the rationale for the use of those strategies; d) successes and weaknesses identified throughout the implementation of the strategies; e) ways in which policy or programmatic impact pathways as laid out in proposals may have been confirmed or modified based on the experience of carrying out the study and engaging with stakeholders; f) how the positionality and composition of the study team influenced engagement strategies (development, implementation, and likelihood of research uptake); g) lessons that investigators would take forward into future projects; h) additional needs to establish an enabling environment for research uptake in the study context. The lead author tailored each interview guide to the goals and targets laid out in respective engagement strategies as well as the point in time at which the interview was conducted.

2.2. Analysis

Analysis consisted of both deductive and inductive content analysis (Elo and Kyngäs, 2008; Kim et al., 2017; Vaismoradi et al., 2013). The lead author initially developed an a priori code list consisting of several broad categories: stakeholder identification; engagement strategies; rationales for engagement; goals for engagement; successes; challenges; policy or program impact pathways. This code list enabled cross-project comparison to identify cross-cutting and emergent themes and further refine the broad code categories through discussion among the study authors. Through this process of coding and discussion, the study authors identified the theme of participation, and the extent to which grantees solicited and incorporated stakeholder perspectives at various stages of the study vis a vis their perspectives on how to successfully position research for uptake at later stages, as a strong emergent theme across projects. As the role and nature of participation in stakeholder engagement is a key topic in the stakeholder engagement literature (e.g., Goodman and Sanders Thompson, 2017), we drew upon the literature to refine the analytical framework to classify and present engagement strategies in terms of the degree of participation sought from stakeholders (Jolibert and Wesselink, 2012) in relation to specific goals for uptake (Oliver et al., 2018).

To protect the anonymity of the researchers in the presentation of results, we have assigned descriptors to indicate the region of study paired with a randomly assigned number to distinguish among projects. Studies that took place in Sub-Saharan Africa are identified as AF1-9 and studies that took place in South and Southeast Asia are identified as SA1-6.

2.3. Ethics

Data used in this study were collected as part of DFC Competitive Grants Program contractual monitoring and reporting activities. Permission to record interviews was obtained from researchers. Data are anonymized to protect confidentiality. This research was reviewed and granted exemption by the University of South Carolina Institutional Review Board.

3. Results

We organized engagement strategies into two broad categories: uni-directional engagement (i.e., informational, researcher-driven engagement that seeks to apprise or update, but does not seek substantive feedback) and bi-directional engagement (more participatory or collaborative engagement strategies that seek feedback to inform research). Uni-directional strategies included sensitization, conference presentations, public engagement products, dissemination of targeted policy or programmatic messages, and dissemination events. Bi-directional strategies included inception feedback meetings, engaging stakeholders as research participants, and dissemination feedback meetings; further detail on each strategy is presented in Tables 1 and 2. Table 3 organizes these strategies in terms of those commonly used to promote evidence use among stakeholders and those used for collaborative knowledge production.

Goals and patterns of engagement are documented in Table 4. We present scenarios of engagement by stakeholder group (community member, sub-national government and practitioners, national government and practitioners, and private sector). This organization is intended to depict the types of goals associated with each group and which strategies were frequently deployed to engage with that group. Scenarios include all points of contact from inception to dissemination to better depict how stakeholder engagement proceeds as a continuum of activity. To further illustrate this point, we include a synthetic scenario in Table 4 where engagement is carried out with goals expressly related to advocacy on behalf of study participants who comprise marginalized populations, necessitating unique combinations of engagement strategies.

3.1. Identification of stakeholders

Participating researchers uniformly reported that they identified

Table 1
Stakeholder engagement strategies: Inception and during the research process.

	Strategy	Example or description	Target stakeholder group	Rationale
Unidirectional (informational and researcher-driven)	Sensitization	Apprising key stakeholders of existence and progress of study at inception and throughout the research process via newsletters, email updates, blog posts, one-on-one meetings, etc., through formal and informal channels	All	Generates buy-in Increased likelihood uptake on backend via creating awareness of and demand for results Raises awareness of study issues among target stakeholders Educates stakeholders on key terms and concepts
	Conference presentations and invited lectures	Researchers present study design	Academic	Communicate with scientific community
Bi-directional (collaborative)	Inception meetings	Collaborative workshops or meetings held with key stakeholders to elicit substantive input on research concepts, outputs, etc.	In-country government and implementing stakeholders (including NGO, donor, and private sector actors)	Aligns research with strategic needs Fosters or enhances stakeholder buy-in
	Stakeholders as research participants	Stakeholders who are targeted for uptake of research are also engaged as either research partners or participants	Policy makers, policy-adjacent institutions (research or educational institutions), community members	Increases ownership of research by in-country stakeholders Fosters in-depth knowledge of study Generates data on novel or underrepresented perspectives

Table 2
Stakeholder engagement strategies: Dissemination.

	Strategy	Example or description	Target stakeholder group	Rationale
Unidirectional (informational and researcher-driven)	Public engagement	Results or other aspects of the research program shared via creative media, such as documentaries, photo exhibits press releases, local news articles (formative feedback not sought)	Typically targeted to non-academic audience	Raises public profile of study Increases demand for results leverages media to amplify dissemination
	Dissemination of targeted policy or programmatic messages	Policy briefs; technical briefs; white papers; infographics	Non-academic	Researchers determine key takeaways for policy and programmatic use; prepare them in "digestible" format that persists
	Dissemination events	Research team hosts a comprehensive workshop or other event at which they present key findings but do not seek feedback or validation of findings	Non-academic	Researchers present results with opportunity for discussion, but stakeholders not involved in "co-creation" of messaging
Bi-directional (collaborative)	Stakeholder feedback meetings	Meetings at which preliminary results are presented and feedback sought from key stakeholders for refinement of final messaging	Varies	"Member check" findings; enhance likelihood of uptake by aligning research findings to stakeholder understandings and needs Hone policy messages Typically results in creation of non-academic outputs such as policy briefs, dietary recommendations, etc.

stakeholders that they thought were likely to be involved in decision-making related to uptake or implementation of their study findings by partnering with strategic in-country institutions. For example, one researcher (SA5) made the strategic decision to partner with public universities that work closely with the government and were also responsible for training national and local nutrition professionals. In this case, partners facilitated access to the district health centers, which was necessary for the research to proceed, and enhanced the trust and legitimacy of the research team locally. Researchers reported that having well-connected and respected in-country partners yielded benefits at different stages in the research process as well as in the targeted dissemination of research findings. Several partners facilitated processes for ethical approval, access to study communities, and relationships with key decision-makers.

One researcher undertook an extensive exercise to identify and map stakeholders with a focus on identifying key subnational stakeholders (AF2). The researcher was already embedded in an in-country implementing organization, but the research topic was new to the organization and they wanted a thorough plan for engagement with key stakeholders from beginning to end. Another researcher that was working in a new topic area for their organization included a scoping phase, consisting of several rounds of outreach to likely stakeholders, who were asked to identify further stakeholders (AF7). This strategy led to the formation of a multisectoral, multi-level advisory group that was engaged at key stages in the research process.

One researcher succeeded in engaging key stakeholders where pre-existing relationships existed between their research partner and the stakeholders but failed to engage where they and their partner lacked a

Table 3
DFC engagement strategies for evidence use and knowledge production.

Goal of engagement	Types of strategies	Inception/process	Dissemination
Evidence Use	Uni-directional strategies	Sensitization	Conferences and invited lectures/ presentations
	Bi-directional strategies	Consensus building/ agenda setting activities	Stakeholder meetings
Knowledge production	Uni-directional strategies	Stakeholders as research participants (also involved in dissemination)	n/a
	Bi-directional strategies	Inception workshops (formative input sought	n/a
		Participatory stakeholder mapping exercises	
		Validation meetings to finalize results	

pre-existing relationship.

> "The personal relationships are always very important. So I suppose the lessons is that you can't–its pretty hard just to pick these things up cold, from nowhere, if you haven't built that relationship in advance, in whatever way, whether you're at meetings, or networking with people, you keep those contacts and you try to build on them." – AF2

This researcher also thought lack of engagement was related to issues internal to the stakeholder, including high personnel turnover and high workload.

Another researcher noted the importance of gender and socioeconomic status in the selection of stakeholders and subsequent engagement strategies. In this case, the research involved both formal and informal governing bodies as well as the study community (women engaged in intermittent and low-earning livelihoods) as research stakeholders. It was important to ensure that the voices of the women were represented in the development of policy recommendations at the end of the project, but there were several nuanced challenges in navigating gender and power dynamics to assemble a representative group of stakeholders. In this case, the researcher worked to find other means of foregrounding the perspectives of women, such as capturing their perspectives on this matter as a component of data collection:

In terms of […] trying to bring [women] more actively into the stakeholder group, it's really not obvious to me that can work in this social context. The power dynamics that are involved there—ignore gender, first of all, but you take [any community member] and you bring them into the same room as the association two levels above them and controls their livelihood, as well as the government. there's no way that they can feel comfortable and confident to speak openly within that room, particularly if they're going to contradict anything any of the other stakeholders said […] just given the social dynamics and on other projects where I've been on the steering committee, they've tried to bring in that community voice by having women there and it just … I've never seen it work well because the power hierarchy is too strong. – AF7.

3.1.1. Engaging with the private sector

Most researchers focused on policymakers, practitioners, and community members as the primary stakeholders of their research. Private sector actors or institutions were involved as study subjects or considered to be key parts of the food environment (including both large and small-scale retailers/vendors) in many studies, but few of the 15 researchers directly engaged them as stakeholders, nor could many see clear implications in their work for private sector action. One exception was a project that involved corporate retail actors as both a subject and a stakeholder of the research, although efforts to engage them in inception and dissemination efforts were unsuccessful. This researcher speculated that lack of engagement could be because the research implications were not clearly applicable to the retailer's decision-making, or perhaps they could be taken by the retailers as critique. The possible sensitivities of the private sector to the work were largely unknown because efforts to engage on the front-end engagement were not acknowledged.

Another researcher's work was predicated on an industry's effects on livelihoods, land use, and nutrition outcomes. Similar to the previous example, the researcher's attempts to engage on the front end and during dissemination were not successful—they also speculated that the industry's general lack of acknowledgement of engagement efforts could be related to the lack of relevance of the research to their operations and decision making, and/or to their sensitivities to their portrayal in research and media. Another researcher was unable to successfully engage with the private sector at both inception and dissemination. They invited private sector stakeholders to events and shared project materials with them but received little to no acknowledgement or feedback.

Another researcher's study was focused on the development of a business model as the research outcome, and they developed a layered engagement strategy from inception to dissemination that involved private sector actors of varying size. Goals for engagement at inception and during the research process were met with both groups. This researcher was cautious about the timing and nature of their engagement with larger private sector actors (not engaged as participants in this project). They thought that seeking substantive formative input at inception from this actor could influence the development of the research model in their favor, to the disadvantage of the other stakeholders and participants.

3.2. Stakeholder engagement strategies

3.2.1. Unidirectional engagement

3.2.1.1. Sensitization. Sensitization was accomplished through several different means at varying points in the research process. Examples of this strategy included formal workshops, in-person meetings, email communication, blogs, mass media products, and newsletters (Table 1). The format used depended on the resources budgeted by the researcher as well as timing and logistical constraints of the researcher's team. This form of engagement was primarily unidirectional and informative. It was typically deployed to generate and/or maintain buy-in among key stakeholders throughout the research process. While some researchers used different forms of sensitization as the primary driver of their stakeholder engagement strategies, most researchers used sensitization strategies to supplement more collaborative engagement strategies that they implemented at the inception of a project.

One researcher noted that, in their experience working in the research setting, sensitization was typically used to engage with policymakers (SA1). That is, policymakers did not seek collaborative engagement in research processes and preferred to engage once results had been obtained. The extreme limitations on their time and attention made brief, semi-regular updates over the course of the project more appropriate to generate buy-in.

3.2.1.2. Conference presentations and invited lectures. Conference presentations, seen as an essential activity of research, were also considered by most researchers to be part of their overall stakeholder engagement strategy (Table 1). Several researchers' primary engagement strategies involved presentations at conferences in addition to more targeted dissemination efforts that may include the development of policy briefs.

Table 4
Patterns of engagement and goals for uptake.[a]

Stakeholder groups	Scenario	Goals	Participants	Strategies	Timing	Intensity
Community members	1	Validate research findings Meet ethical obligation to participants	Research participants	Validation meetings (n=2)	Mid-process	1 meeting per village at 1 point in time
	2	Community uptake of dietary recommendations	Research participants and other community members Local health officials	Interactive workshops at which findings – dietary recommendations are presented and discussed with community members (n=27)	End of project	1 meeting per study village at 1 point in time with coverage of all study villages
Subnational government and practitioners	1	Subnational and local use of research findings in decision- and policymaking	Local and district government officials (nutrition, agriculture, environment, other) Practitioners active in study regions	Participatory stakeholder mapping (n=1) Inception workshop (participatory) (n=1) Regular communication of project updates with stakeholder groups (informal) Results validation meetings at subnational levels (n=3) Collaborative development of key policy messages (formal and informal communication) Targeted dissemination of project reports and briefs (virtual)	Inception In-process Post-results (near-end of project and end of project)	Multiple points of contact at all stages of research Relies on both formal and informal communication Significant leveraging of networks of in-country research partners
	2	Uptake of research findings among district government officials	District-level government officials (health, agriculture, environment, administrative, planning) Private sector representatives	Engagement with key policy-adjacent institutions (i.e., polytechnic institutes) as research partner Outreach to relevant private sector actors with invitation of formative input/involvement District dissemination workshops (n=3) Development of policy brief with stakeholder input Dissemination of brief through virtual channels	Inception Post-results (near-end of project end of project)	Contact with multiple stakeholder groups at all stages of research Strategic inclusion of policy-adjacent institutions as research partners to facilitate indirect pathway to policy uptake
National government and donors/ practitioners	1	Feed evidence into national-level decision-making processes for policy	National policy makers High-level donor coalitions in-country Academics	Early unidirectional sensitization of key stakeholders via one-on-one meetings or by engaging key stakeholders as research participants No mid-point contact Dissemination event/workshop Policy brief	Majority of activities conducted at end of project	Engagement largely concentrated at one point in research process (dissemination workshop) and largely unidirectional/ informative Driven by perception that policy makers not interested in intensive involvement in research process, mainly interested in results and finalized policy messages
	2	Feed into national priorities for action and promote timely use of project evidence in policymaking	National policy makers High-level donor coalitions in-country Media Research participants	Intentional alignment of research questions with national priorities Inception feedback workshop (n=1) Regular updates communicated to key stakeholders (informal)	Inception In-process Post-results (near-end of project and end of project	Multiple points of contact at all stages of research Relies on both formal and informal communication (pre-existing relationships helpful in this regard) Significant leveraging of

(*continued on next page*)

Table 4 (*continued*)

Stakeholder groups	Scenario	Goals	Participants	Strategies	Timing	Intensity
				Involvement of policymakers as research participants in iterative, intensive goal-setting process Dissemination event involving community members and media as public engagement component (photovoice exhibit) (n=1) Dissemination webinars in 2 languages (n=2) Tailoring of project outputs to multiple non-academic audiences (e.g., press releases, newspaper articles, blogs, briefs, glossy booklets, white papers) Virtual dissemination of project outputs via strong network platforms (e.g., SUN Academic Platform).		networks of in-country research partners Outreach strategies tailored to multiple specialized audiences, i.e., policy makers, media, participants, public, researchers, and practitioners.
	3	Feed into national priorities for action and promote timely use of project evidence in policymaking	National policy makers Regional policy institutions (bi- and multi-lateral donors and global-country coalitions) Private sector actors Academics Community members	Intentional alignment of research questions with national priorities Inception feedback workshop (n=1) Regular updates communicated to key stakeholders (informal communication channels) Mid-process presentation of results at key regional multistakeholder forum (n=1) Public engagement strategy with strong advocacy component (documentary) (n=1) Final dissemination workshop targeting multisector stakeholders (n=1) Collaborative development of policy brief with infographics and dissemination through virtual channels Publication of study findings in outlet geared to policy and decision-makers (n=1)	Inception In-process Post results (near-end of project and end of project)	Multiple points of contact at all stages of research Leveraging of networks of in-country partners and pre-existing relationships Outreach strategies tailored to multiple specialized audiences, i.e., policymakers, private sector, participants, public, researchers, and practitioners.
Private sector	1	Develop business model for public private partnership that does not rely heavily on government subsidies (role of private sector is focus of study).	Local vendors (primary) Large corporations	Seek detailed formative input on intervention model from local vendors as research participants Seek formative commentary from corporations (involvement in testing of model at this stage is nascent, but engagement with these actors intended to ramp up once model is finalized at a later stage) Local vendors involved as research participants Dissemination to wide audience	Inception In-process End of project	Local vendors are engaged intensively throughout as both stakeholders and participants Policymakers and large private sector stakeholders engaged at inception and dissemination

(*continued on next page*)

Table 4 (*continued*)

Stakeholder groups	Scenario	Goals	Participants	Strategies	Timing	Intensity
				including all private sector stakeholders/participants as well as government representatives (aim to generate pathways for public-private partnerships)		
	2	Initiate conversation with private sector towards their involvement in creation of healthier food environments – engagement sought because private sector interests related to research question and/or eventual solutions/ recommendations, but private sector not central object of study	Large corporations operating locally	Early outreach to sensitize stakeholders to research and/or invite commentary on project Regular updates throughout research process Invite commentary during development of key policy messages Invite to dissemination events Share outputs	Inception In-process End of project	Seek engagement, primarily unidirectional (informational), but occasionally bidirectional (more collaborative), at key research stages.
Other: advocacy for special/ marginalized populations	1	Bring high-level attention to needs marginalized populations	National ministries Informal local authoritative bodies Local practitioners Research participants Relevant private sector actors	Formation of multisectoral stakeholder advisory groups to provide formative and ongoing input on research process and findings Development of recommendations and targeted messages Careful foregrounding of perspectives of research participants (obtained qualitatively) in light of local hierarchies with researchers as brokers of this knowledge	Inception In-process End of project	Advisory group involved at all key stages of research process In-depth collection and analysis of qualitative data Ongoing deliberative process to ensure inclusivity/representation of marginalized voices in decision-making processes

[a] Scenarios of engagement are derived from individual projects and are presented by stakeholder group (community member, sub-national government and practitioners, national government and practitioners, and private sector). This organization is intended to depict the types of goals associated with each group and which strategies were frequently deployed to engage with that group. Scenarios include all points of contact from inception to dissemination to better depict how stakeholder engagement proceeds as a continuum of activity. The advocacy scenario synthesizes across several projects and provides an example of how grantees developed and coordinated engagement strategies across stakeholder groups to achieve goals of equity and inclusivity in research and strengthen policy and advocacy messages.

3.2.1.3. Public engagement. Public engagement products included short documentaries and a photovoice exhibit (Table 2). These products delivered powerful advocacy messages by communicating the voices and experiences of research participants, particularly those who are not usually consulted in policy design, to decision-makers:

> "…the goal of making the video was to kind of give life […] to what in some ways seemed like a scientific question a little bit removed from real people and to let people tell their own stories. And also in some ways to share what the landscapes look like - you don't really get that when you read a paper or when you're sitting in a conference room talking in [a country's capital city]." – SA5

Another researcher planned a photovoice event, to which they invited local policy actors, media, and community members. The event included local leaders, who were able to interpret the significance of the photos for higher level decision-makers:

> "…the photovoice exhibition exercise was another way of conveying findings back to the community. […] I think it generated a lot of interest […] the community reflecting on what the photos meant and the participants also speaking to their photographs is very powerful. And then the local leaders who were there saying what that might mean on a local level, what I suppose local policy priorities might be in terms of food access, financial access, I think particularly food hygiene. So yeah, the photos are a really good way of illustrating the main findings quite powerfully." – AF5

3.2.1.4. Policy and technical briefs. Nearly all researchers developed policy briefs to convey key findings and recommendations to decision-makers (Table 2). Researchers viewed these products as the primary means of communicating research to decision-makers. One researcher shared their process of developing and tailoring key policy messages from the research:

> "We will be trying to tailor the briefs to different audiences. […] So for example, for people that might be […] more involved in community development, the policy briefs and research findings are framed more from a livelihoods perspective […] But when we think more about the nutrition groups, we look at it more in line with specific foods and the ways foods and food patterns have been changing. […] That's why we're doing this at different levels of the conceptual framework [of the study]. Within each of the levels, it'll probably be further segmented into which ones are going into the nutrition and health policy groups, how do we frame that, versus the community development groups, and then thinking about how to

synergize those so that those sectors actually recognize the need to work together." – AF4

Researchers noted the difficulty of developing key messages and recommendations for policy briefs, and that it required some level of experience (if not expertise) to do well. Researchers thought that some level of science communications expertise was also ideal to develop visually compelling briefs.

3.2.1.5. Dissemination events. Several researchers planned dissemination events (examples include workshops and webinars) at which they presented results to policy and other decision-makers (Table 2). These events were not necessarily intended to generate discussion or feedback. Some researchers opportunistically scheduled their events as part of a related event; others planned their own, exclusive events. Scheduling opportunistically was typically more cost-effective, particularly for researchers with little to no presence in-country. Furthermore, taking part in a well-known and well-attended event facilitated access to policy and other decision-makers, whose time and attention are limited and thus are typically careful in prioritizing events to attend. Researchers who planned their own event separate from any larger event usually had in-country partners who were relatively well-resourced and connected to facilitate, but several researchers mentioned the challenge of affording the per diems customarily required by government officials to attend such events.

3.2.2. Bidirectional engagement

3.2.2.1. Inception feedback meetings. Researchers both organized their own workshops and sought opportunities to align with existing events, depending on the resources of their in-country partners, their time, and their budgetary constraints (Table 1). Researchers who held inception feedback meetings thought that this exercise enabled them to better align their research outputs with national priorities:

> "…[the inception meeting] didn't shape the research from the beginning enormously - we already had a clear idea about our aims and methods, but what it did do from my perspective was it made us realize which of those particular elements were especially important and how we needed to focus to make it all very accessible in terms of what we find." – AF5

Several researchers who engaged stakeholders at inception noted that being able to engage the same stakeholders for the entirety of the project increased ownership and buy-in, which they thought enhanced the likelihood of uptake.

Engaging early with key decision-makers allowed researchers to build positive relationships and reputations among decision-makers. One researcher noted that in their research setting, there was a history of researchers failing to engage with decision-makers, yielding work that potentially held little relevance to the setting and was poorly received:

> "We [speaking from his perspective as a decision-maker] had had experiences which were bad in the past. Researchers go ahead, design their studies, implement them, come up with findings, then bring the findings to these stakeholders to implement. Some of the questions we would pose to the researchers - where were they when these ideas were hatched out?" – AF5

3.2.2.2. Dissemination feedback meetings. Several researchers planned participatory dissemination events at which they sought input on interpretation of results or in the development of recommendations (Table 2). As with unidirectional dissemination events, researchers had to determine the feasibility of hosting these events independently or as part of larger events depending on the connectedness and resourcing of their in-country partners, timing, and money available for per diems and other hosting costs.

One researcher held a validation workshop prior to the finalization and dissemination of their recommendations (SA6). The researcher circulated a draft policy brief prior to the workshop, at which they sought input on whether their recommendations were feasible and brainstormed other potential recommendations. An additional goal of the workshop was to reach consensus on solutions with the participants so that the researcher could be confident that their recommendations had high-level endorsement. Following the workshop, the researcher revised and recirculated the brief, inviting stakeholders to give final endorsement or raise any further concerns. Stakeholders provided detailed feedback, which the researcher interpreted as evidence of meaningful engagement. The researcher thought that the consultation process was key in promoting ownership and generating enthusiasm among the stakeholder groups and that it successfully introduced the study topic and framing into the discourse among their stakeholders. This process also enabled the researcher to develop a deeper understanding of the sociopolitical issues pertaining to their study.

Another researcher shared the mixed reactions they received when they sought feedback on their preliminary results from national-level stakeholders:

> "I feel like one of the things that was not so great […] I think we had that meeting a little bit too early because people were hungry for a real clear policy message and where we were […] we were hesitant to actually give a strong policy message yet. So people drew their own conclusions and most of the conclusions were the ones that we are reaching as well, but in terms of "so what do we do now" we're still not so clear unfortunately." – SA5

3.2.2.3. Stakeholders as research participants. Some researchers designated policymakers and other end users of the research as study subjects (Table 1). One researcher, with the goal of immediate uptake of dietary recommendations among participating communities, implemented a "community readiness model," a participatory method which helped the researcher assess the readiness of urban communities to implement interventions to improve diets of women of reproductive age (Pradeilles et al., 2019).

> "…we had reps from development agencies at the community, health workers at the community, religious leaders, traditional leaders, youth leaders, commerce […]. All of these have different contributions or influences on the food system and the subject that we were investigating. We also had assemblymen (whether men or women) they were also part of the community readiness assessment that we did." – AF5

Another project with goals for uptake among study communities held validation meetings with participants in all study villages and developed posters with dietary recommendations for local clinics (SA5).

3.2.3. Logistical constraints

In addition to challenges related to research settings that have been described throughout, project-related logistical constraints strongly shaped engagement strategies. Researchers identified the relatively short timeframe of the projects (18–24 months), limited budgets for the engagement components of their projects, and project personnel challenges (turnover, lack of time, unexpected leaves of absence) as key constraints to the development and implementation of their engagement strategies.

3.3. Timing and intensity

Several researchers noted that timing of engagement depends on the type of stakeholder. For example, the policy stakeholders engaged in the inception meeting may not include federal ministry representatives

because of their ways of operating (i.e., the common perception that federal representatives typically do not want to engage in the work itself and may not feel their direct involvement is needed throughout the research process). Several other researchers agreed that engagement with policymakers at inception is not always likely to succeed, and that it is a more successful strategy to engage them once there are results to share:

> "In the beginning when you invite people for, for these kind of meetings, a lot of the important people [policymakers] don't turn up because there's nothing to share yet." - SA1

In contrast, one researcher undertook an intensive, multi-phase consensus-building process with national policymakers as part of the research process (AF5). This component intended to both build buy-in and firmly situate study findings within policy priorities and implementation capacities. Following this process, the researcher received commitment from the policymakers to implement study findings. In addition to timing of engagement, a key component of stakeholder engagement strategies was to determine the intensity of engagement with specific actors. For example, one researcher intentionally sought a policy-adjacent institution as a research partner (in this case, a National Institute for Nutrition) (SA5). This partner was engaged from project inception to dissemination. Other key stakeholders, however, particularly the federal-level Ministry of Health representatives, were not engaged until dissemination. By this time, the frequent points of contact with the National Institute of Nutrition, including both informational and collaborative efforts, fostered a strong relationship between this institution and the researcher. The National Institute of Nutrition then facilitated access to high-level Ministry of Health representatives at the end of the study. As noted previously, several researchers thought that having the same key stakeholder involved in some capacity from inception to dissemination promoted buy-in and uptake.

Researchers developed engagement strategies that targeted multiple stakeholder groups and implemented them concurrently. Some researchers developed fully uni-directional strategies to engage with all of their stakeholders, but many used a mix of uni- and bi-directional strategies. Fully uni-directional strategies were more commonly deployed when the primary goal of the researcher was to engage for decision-making. Mixed bi-directional strategies were more commonly used to engage stakeholders for both decision-making and knowledge production (Table 3).

Researchers linked their goals for uptake to patterns of engagement (i.e., the mix of strategies, timing, and intensity). Table 4 presents scenarios of engagement (organized primarily by stakeholder group) that are derived from individual projects. The advocacy scenario in the table provides an example of how researchers developed and coordinated engagement strategies across stakeholder groups to achieve goals of equity and inclusivity in research and strengthen policy and advocacy messages.

3.4. Researcher positionality and stakeholder engagement strategies

Several researchers had an explicit goal to communicate experiences of marginalized populations to decision-makers in order to prompt high-level action that could lead to more equitable treatment of these populations. In these cases, communities were strongly engaged as stakeholders. These researchers developed outputs, especially public engagement products, collaboratively with study participants. According to researchers, this served three primary purposes: to enable researchers to validate study findings and recommendations with participants, to facilitate a more profound connection with the study findings among decision-makers (i.e., communicating the individual experiences and research context along with study findings), and to provide communities with a way of interfacing with the research process that, although still researcher-driven, was not framed entirely in scientific language or from the point of view of the researcher. These researchers also tended to seek more opportunities to engage with all stakeholder groups, and tended to use more bi-directional engagement strategies as compared to researchers whose primary goal was to provide evidence to inform decision-making among program and policy stakeholders.

4. Discussion

For most DFC researchers, stakeholder engagement began with aligning research questions with issues of national importance (through previous knowledge of the research setting, stakeholder mapping exercises, and inception meetings), which researchers thought enhanced the relevance of the research and chances for uptake among target audiences (Oliver and Cairney, 2019). Researchers aimed to include stakeholders with both theoretical and pragmatic importance, which began with the careful selection of research partners and subsequently involved formal or informal stakeholder mapping exercises. Researchers typically engaged with multiple types of stakeholders but were careful in selecting which stakeholder groups to engage at specific points in the research process and how. Researchers sought to generate and maintain buy-in among decision-makers through targeted communication (both uni- and bi-directional) from inception to dissemination (Forsythe et al., 2016; Jolibert and Wesselink, 2012). Researchers largely benefited by engaging with policy processes in the country to ensure that research was both seen as timely and interpreted by stakeholders as intended by the researchers. Engaging with policy processes typically meant involving key stakeholders at strategic points throughout the research process and developing and disseminating targeted messages to policymakers in the form of briefs (for useful guidance on developing policy messages, see Table 3 in Cullerton et al., 2016a). While all researchers focused on drivers of food choice among vulnerable populations, their goals for research impact varied. Several researchers (at least implicitly) occupied the role of "information brokers," wherein their primary goal was to produce evidence that would inform decision-making. A few researchers positioned themselves as what may be termed "issue advocates" wherein an explicit goal of the research was to highlight inequities among vulnerable or marginalized populations and communicate this evidence directly to policymakers to prompt action (Oliver and Cairney, 2019). In these cases, researchers tended to seek more opportunities to engage stakeholders and/or seek more bi-directional engagement and use creative media, including short films and photo exhibitions, to relay findings to key stakeholders.

An example of a successful engagement strategy from the DFC portfolio is one in which research was designed to engage stakeholders in both knowledge production as well as in decision-making. Two projects responded to national priorities and engaged key high-level decision-makers at inception and dissemination with at least one bidirectional strategy (in-person feedback workshops and/or soliciting substantive written feedback on drafts of project briefs), and provided updates (uni-directional communication) throughout the research process. During the research process, researchers used a mix of bi- and unidirectional engagement with implementing actors and intended beneficiaries as both stakeholders and participants. At dissemination, research findings were developed into policy briefs. Researchers used this layering of strategies to produce evidence that they thought would have immediate relevance within study contexts. In most cases, project findings were (anecdotally) well-received by decision-makers and, in one early case, led to immediate uptake.

Data for this study were gathered through interviews conducted as part of routine monitoring and management activities and with investigators with the most influence over development and implementation of engagement strategies. In most cases, these investigators with the most influence over these strategies were principal investigators and co-investigators from lead institutions outside the country of focus. Data are descriptive summaries of researcher

perspectives and are subject to the motivations and interpretations represented in the presentation of strategies and rationales by the investigators in this sample. As such, our data is dominated by the perspectives of outside researchers rather than in country partners or stakeholders who may have had additional insights regarding strategy development, stakeholder targeting, implementation, and effectiveness. Additionally, as few researchers included private sector stakeholders in their engagement strategies, we offer limited insight on how these practices are conducted. Private sector engagement is of substantial interest to donors, researchers, and the private sector and warrants further research.

This study advances knowledge about practices for stakeholder engagement in multisectoral nutrition by synthesizing learnings regarding how researchers identify key stakeholder groups and develop engagement strategies responsive to broad goals for engagement (evidence sharing or knowledge production) within the constraints of resources and project personnel, stakeholder needs, and preferences for timing and intensity of engagement. In highlighting the nuance and complexity of stakeholder engagement carried out with the goal of achieving instrumental impact, this study points to opportunities to promote equitable and effective research relationships even where resource constraints and donor imperatives effectively predefine (and often narrow) the scope for engagement at the outset of a project. Findings may aid researchers in constructing engagement strategies that are responsive to diverse research programs and goals within complex multisectoral nutrition landscapes in LMIC. Future research programs should systematically document stakeholder engagement processes through adjacent process monitoring and/or evaluation, which will yield substantial insight into translational and implementation processes as well as methods to assess impacts and enhance efficacy of stakeholder engagement strategies.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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