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Investing in Communication for Nutrition Related to Agriculture in India

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Investing in Communication for Nutrition Related to Agriculture in India

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health communication, behavior change communication, mass media, radio, nutrition, agriculture, development, monitoring, evaluation, India

Disciplines

Agriculture | Communication | Health Communication | Nutrition | Social and Behavioral Sciences

**Investing in Communication for Nutrition
Related to Agriculture in India:
*A case for investment and how to construct a
successful intervention***

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**Report submitted to the Bill and Melinda Gates
Foundation¹**

¹ The views expressed in this report are the authors' and do not reflect the view of the Bill and Melinda Gates Foundation.

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Executive Summary:

Objectives:

A four person team led by the University of Pennsylvania, Annenberg School of Communication prepared this report. We had two tasks:

- To consider the case for investments in communication for nutrition related to agriculture to increase the production of, access to or consumption of more nutritious foods by households in two countries: India and Ethiopia. This report focuses entirely on India. There is a separate report for Ethiopia.
- To provide some advice about how to construct such communication interventions so that they maximize the likelihood of success.

All four members of the team, Robert Hornik, Danielle Naugle, Tanya Trevors, and Bill Smith spent two weeks in Delhi meeting with experts at BBC Media Action, McCann Global Health, IFPRI, the BMGF, FHI360 (Alive&Thrive), Population Media Center, ACF, Digital Green, GAIN, CARE, JHUCCP, and the Micronutrient Initiative. One member of the team, Danielle Naugle, then spent an additional three weeks in India in the BMGF's priority states – Bihar and Uttar Pradesh. In Patna, the capital of Bihar, Danielle met with experts at JHUCCP, Project Concern International, and CARE. She also spent two days in the field with BBC Media Action and two days in the field with Digital Green. In Lucknow, the capital of Uttar Pradesh, Danielle met with Catholic Relief Services and went on field trips with PATH and with Rajiv Gandhi Mahila Vikas Pariyojana (RGMVP). Finally, on her return to Delhi, she met with experts at Catholic Relief Services, the Rural Marketing Association, Gram Vaani, CMS Communication, mKisan, and the Center for Knowledge Societies.

What is behavior change communication and the place of the media in India?

Behavior change communication (BCC) can include any systematic effort to communicate messages to audiences with the intention of affecting their behavior. In India, BCC substantially relies on direct interpersonal communication (IPC) between front line workers and the population. We conclude that BCC can be substantially more effective if current IPC efforts are complemented with mediated communication reaching the population repeatedly and guided by systematic feedback. Without a mediated communication component, direct exposure to messages addressing nutritional change will be too infrequent, the quality of messages problematic, and the maintenance of a message flow over time unreliable, undermining the ability to address new behaviors and new audiences.

We propose that the BMGF consider a grant program that would have three goals:

- a. Show that a communication intervention was able to influence worthwhile behavioral outcomes related to nutrition/agriculture.
- b. Create a model of intervention which (a) includes a method for assuring adequate reach and frequency of exposure; (b) is able to develop persuasive messaging; (c) is responsive to the quickly

- evolving media landscape; (d) is guided by systematic and frequent feedback about intervention effects to respond to the changing behavioral landscape; (e) is scalable at acceptable cost; and (f) which will be continued by other institutions once BMGF funding was ended.
- c. Develop a communication institution that is or will become capable of supporting BCC for other behavioral outcomes, and working with other partners in furthering their behavioral goals.

The team urges the Foundation to place heavy emphasis on simplicity of design and execution. Too complex programs may not be absorbed into local government activity. This means simple behaviors, simplified formative research systems while favoring more rigorous monitoring and mid-course corrections, plus the procurement of local talent and resources through government, NGO or private-sector systems.

What is the potential for BCC involving mass media for nutrition in India?

BCC which involves mass media has been shown elsewhere to be a valuable tool in reaching very large numbers of people with powerful messages, often leading to changes in critical behaviors.

Wakefield, Loken and Hornik (2010) summarized the evidence about “Use of Mass Media Campaigns to Change Health Behavior” in both more- and less-developed country contexts for the Lancet in 2010.ⁱ They concluded “mass media campaigns can produce positive changes or prevent negative changes in health-related behaviours across large populations.” In considering what contributes to successful outcomes for such programs they pointed to “concurrent availability of required services and products, availability of community-based programmes, and policies that support behaviour change.” They argued for “investment in longer better-funded campaigns to achieve adequate population exposure to media messages.”

Through a systematic review of the literature, Naugle and Hornik (2014) summarized and evaluated the evidence for the effectiveness of mass media interventions for child survival in lower- and middle-income countries.ⁱⁱ The authors reviewed evaluations of campaigns addressing diarrheal disease (15), immunization (8), malaria (2), nutrition (14), preventing mother-to-child transmission of HIV (1), respiratory disease (4) and reproductive health (67). They concluded that interventions with mass media campaigns can positively impact a wide range of child survival health behaviors in low- and middle-income countries. These include one-off behaviors like tuberculosis testing or vasectomy, episodic behaviors like vaccinations, use of oral rehydration therapy, and early initiation of breastfeeding, and habitual behaviors like nightly bed net use, hand-washing, consumption of iron and vitamin A-rich foods, and use of modern contraceptives. In addition, they found that evaluations show effects across theoretical frameworks, channels, target audiences, message types and styles, and evaluation designs.

Although data on the cost-effectiveness of health communication campaigns is limited, some studies suggest that mass media centric interventions can be an

extremely cost-effective approach. Only two of the evaluations included in the 2014 review provided cost-effectiveness data: Guilkey & Hutchinson (2011) detail costs of \$0.05 per additional antenatal care user and \$0.30 and \$0.36 for each additional child vaccinated for measles and DPT3 respectively. Bowen (2013) determined that the Knock Out Malaria Campaign cost \$1.62 per additional person protected by a mosquito net. In the evaluation of a TV serial drama to promote condom use in India, investigators determined that the cost-effectiveness of the drama was \$2.49 per person using condoms more consistently and of TV spots was \$2.70.ⁱⁱⁱ Using the Lives Saved Tool, Roy Head and colleagues have estimated that saturation-based media campaigns cost \$1-\$10 per DALY (disability-adjusted life year saved) to deliver.^{iv} According the World Health Organization, interventions that cost below US\$100 per DALY averted are “good” and those that cost below US\$25 are “excellent,” placing mass media campaigns among the most cost-effective of all currently available health interventions (the most cost-effective being childhood immunizations at \$1-\$8 per DALY averted).

Nevertheless, the application of BCC which involves mass media in the context of the food system to reach poor rural audiences at scale is not well understood. In the case of agriculture related to nutrition, BCC interventions have good potential to reduce under-nutrition because they can play a central role in addressing both the immediate determinants of nutrition through nutrition specific interventions and the underlying causes of undernutrition through advocacy for programming and policy in other sectors which support nutrition-sensitive decisions. However, that success is contingent on skill (or reliance on partners with the skill) in the choice of behaviors, the development of persuasive messages, the development of a strategy for getting exposure to those messages, and the construction of a research and feedback system able to support the program.

The difference between behaviors, behavioral categories and goals

The report emphasizes the differences between addressing behaviors (feed a 12-24 month old child an egg every day) and addressing nutrition goals (reduce stunting) or behavioral categories (increase dietary diversity). Communication interventions can only address behaviors.

While the literature is good at defining priority audiences (pregnant and lactating women; children under 5), desirable goals (reduced stunting and reduced iron-deficiency anemia), and behavioral categories (more iron-rich foods, increased dietary diversity), there is less consensus on promising behaviors. Our discussion of candidate target behaviors focuses, then, on the processes for prioritizing behaviors. There are two essential questions we address: can the case be made that a particular behavior is meaningfully related to nutritional status? Can the case be made that it is a behavior likely to be open to a communication intervention? Drawing on diffusion of innovation theory, we point to factors that would make a behavior more promising: relative advantage, compatibility, low complexity, trialability, visibility as well as not requiring extra resources and requiring fewer decisions from adopters. We point to the particular advantage of using a

communication intervention to support a newly available or changed product in the market.

What is happening in India regarding communication?

India has a long tradition of using mass media for social change: during the Green Revolution, through decades of fertility reduction communication, in addressing tuberculosis, diarrheal disease and HIV/AIDS, and for encouraging polio vaccination.^v But current use of media at scale, particularly mass media, to influence health or nutrition appears to be weaker. This reflects a number of forces: changes in the mass media system which makes it more expensive to reach audiences; existence of an army of front line health workers who are the primary information diffusion channel; non-governmental organization (NGO) energy being focused on exploiting rapidly diffusing mobile phone and other digital technology; and the multitude of languages both within and across states.

Communication technology is being used to support FLWs. The bulk of NGO efforts to use digital technology and mobile phone technology in India, at least in the health and nutrition areas, are focused on training front line field workers (FLWs), or on supporting them in their interactions with the population. We reviewed available reports and met with NGO project staff involved in doing BCC in Bihar and Uttar Pradesh (UP). While we learned that some projects are beginning to show evidence of effects, we were also left with serious concerns about exclusive dependency on the FLWs to reach the population given their workload and capacity.

Can the FLWs reach the population with nutrition/agriculture information? The FLWs have a large number of tasks, many families to work with, are volunteers and/or are incentivized to undertake some but not other roles, and are trained and re-trained through 'cascade' training systems with inevitable quality concerns. The mobile phone training and support and other uses of digital technology may help provide better quality interactions with people when they occur. But it is not clear that the FLWs reach the population with sufficient frequency or that they have sufficient opportunities for interaction to communicate nutrition information effectively, given all the other demands on them. This lack of opportunities for interaction is exaggerated when we consider the agriculture sector, since India does not have a government system of village-level agriculture extension workers.

Many nutrition behaviors will require multiple exposures over time if they are to be influenced by BCC. FLWs are unlikely to be able to provide such exposures, particularly on a repeated basis. The task, then, is to propose alternative channels for reaching the population frequently. Although there are limitations on access to mass and other media which can directly reach the population, we conclude that they are the most promising strategy for addressing this fundamental problem of reach and frequency.

Can mass media reach audiences? There is a lack of recent data about mass media use and, in the context of a quickly changing media environment, this undermines

strong claims. However, available studies suggest that less than half of the rural population in both UP and Bihar report regular use of radio, TV or print and that access to each of those sources and to mass media varies sharply with education, gender, and geographic areas within states. Mobile phones are spreading rapidly, are likely owned by more people than any other medium, and have been used to stream radio-like content. Some media, particularly TV, may be shared in a village. Access to media is constrained by availability of electricity, costs of ownership, broadcast reach, gender roles related to media access, time to make use of media, and possibilities for socially shared use of media.

What will an implementing agency need to accomplish to construct a communication program?

The report then focuses on building an intervention particularly likely to be effective in using communication to influence the chosen nutrition behaviors related to agriculture. We recognize that the strategy will be highly contingent on what behavior and what audience is targeted.

Steps in developing the exposure strategy

- Deciding whether the audience is actively seeking information to solve a problem or they must be assumed to be passive and likely to be affected only if they are frequently exposed to messages and through multiple channels.
- Choosing channels which can provide the intense levels of message exposure if they are needed (considering radio, television, but also mobile phone technology and other channels).
- Considering how to complement any realistic outreach by interpersonal channels with direct reach media.
- As the program evolves, respond to rapid changes in the media environment where that provides additional opportunities to reach an audience at an acceptable cost.

There will be some tension in those choices. On the one hand, it will want to shape the program so it is most likely to be successful; on the other hand, it will want to design a program that is scalable, that it is feasible both from an operational and a financial perspective, and that can be taken over by likely partner agencies within the states where it is working after BMGF funding is ended. An additional task will be building the capacity to assist other organizations in this substantive area with their communication work.

Using research to support the program

The program must also sort through how to effectively shape the content of messages by using formative research at the program outset, pretesting messages, and then monitoring how the messages are understood and responded to. Formative research and message development strategies are well understood and practiced by serious communication agencies; the report makes a more novel argument in the area of monitoring research.

How to build up a monitoring/feedback system: We argue that communication programs are not fixed interventions like vaccines or pills; they need to evolve as they operate and that evolution will be much better grounded if it is based in systematic quantitative assessments. Indeed, we argue that investment in constant feedback systems may be more helpful to programs than the heavy investment in the pre-project formative research that is now quite common. We also note that the availability of mobile phone technology may prove a great boon to making such feedback systems cost-effective. We note that feedback systems depend on human resources to shape the feedback research and to take advantage of the data gathered to actually make sure the results affect program decisions.

How to undertake a summative evaluation. We argue that the summative evaluation does need to be overseen by an independent agency and that it should use behavior change as its primary outcome (not knowledge, and not nutritional status). We suggest a range of research designs and design considerations for evaluating the program. They share certain elements including making multiple comparisons where access to the intervention varies (naturally or through manipulation) over time and/or across geography and employing frequent measurement starting well before program initiation. We express skepticism about the possibilities for randomized controlled designs because RCTs often (1) constrain how multi-channel communication (and particularly mass media based programming) is implemented to avoid contamination of control areas but with the result that exposure to messages can be minimized, (2) are implemented in such a meticulous way as to misrepresent what a program would be like if implemented under ordinary circumstances, (3) are often not able to accommodate midstream changes in the intervention and which are often required for communication interventions, and (4) can be expensive, absorbing resources that might otherwise be committed to fully realizing program implementation. In addition, designs which allow detection of effects that diffuse through indirect exposure, incorporate measurement of exposure and other mediating variables, and sampling strategies permitting comparisons of effects across groups would be a priority. It is possible that the previously described feedback system, if carefully constructed, might provide the data both for improving program operations and for the summative program evaluation.

Who is the priority audience for the program?

There is a running theme in the report about the imperative to reach the poorest of the poor, but there is a risk that their lack of access to mass media may make them particularly hard to reach repeatedly. They also may lack the resources to implement some of the recommended behaviors. On the other hand, the available data indicate that there is a substantial population who may be a little better off economically, but who still suffer from high rates of anemia and stunting. Their slightly more advantaged economic status means that they are more likely to have media access and more income or land which may allow them to more easily adopt some pro-nutrition behaviors. They may be an early audience for the program. In any case, given the evolving nature of communication access in rural Bihar and Uttar

Pradesh, it will be important for the feedback, feed-forward, and evaluation aspects of this program to know which socio-economic groups within the target population are accessing the media and adopting the behaviors and to then be able to adjust the implementation approach as needed.

Choosing a local implementing agency

The identification of a government or local private sector or NGO with the capacity to develop such a program should be a requirement for proceeding with the program. The team explored a variety of private sector opportunities and determined, that without a clear product or service to market, private sector participation was improbable. Placing management of the program in the hands of a competent contractor, but without close ties to an Indian agency, may improve the probability of immediate positive outcomes, but it reduces the possibility of sustainability.

Fortunately, India has many institutions and skilled experts with strong histories of doing communication (including mediated communication) in health and as well as addressing other development outcomes. Many of these institutions have specific experience in working closely with government agencies. Much of this experience is relevant to thinking about applications of communication to nutrition and agriculture. This experience base, some of it in institutions already funded by BMGF, will provide an essential foundation for any new BMGF investments.

Priority should be given to an organization with substantial experience working in India and with demonstrable ties to government agencies and clear openness to working with other NGOs with relevant experience. It should have a history of doing large scale communication in health and/or in agriculture, including mass communication. It should be open to the core recommendations for constructing an intervention (intense direct messaging, strong feedback system). It should be willing to allow an outside institution to undertake the summative evaluation and be willing to collaborate in developing an implementation plan that facilitates evaluation.

Conclusions

The report concludes with the basis for choosing Bihar or Uttar Pradesh as a site for the project: both states have large nutrition deficits, the size of the populations means success here is important, there is a good deal of local communication experience and expertise, some rising governmental support for addressing under-nutrition (although limited from the agriculture sector), and there is local availability of nutritious foods, including animal source foods and increasing access in Bihar to fortified food products.

We do not think it will be feasible to operate at a state level from the start. An early task of the implementer will be to choose a geographic focus and a population focus for the program. These foci choices will reflect knowledge about distribution of nutrition deficits and related behaviors and opportunities for change, local agriculture and livestock value chains, media access across alternative places and subpopulations, evaluation requirements and other issues described in this report.

Introduction

Behavior change communication (BCC) has been shown to be a valuable tool in reaching very large numbers of people with powerful messages, often leading to changes in critical behaviors. Much of this work has addressed public health concerns such as immunization, diarrheal disease control, breastfeeding, family planning and HIV/AIDS. However, evaluations also show that many communication for development programs have not been successful, often because they exposed their audiences to too few messages, because their messages were unpersuasive or because their target behaviors were not open to influence by communication alone and communication was not used as a complement to other changes.^{vi} Of particular interest, there are relatively fewer cases which have made use of communication on a large scale to influence nutritional outcomes related to the agriculture sector.

Our task here is to consider the case for investments in communication for nutrition related to agriculture and to provide some advice about how to construct such communication interventions so that they maximize the likelihood of success. Behavior change communication can include any systematic effort to communicate messages to an audience with the intention of affecting their behavior. In India, BCC will likely succeed only if it complements current efforts relying on face-to-face communication with mediated communication guided by systematic feedback. Without a mediated communication component, exposure to messages addressing nutritional change will be too infrequent, the quality of messages problematic, and the maintenance of a message flow over time unreliable, undermining the ability to address new behaviors and new audiences. In the following pages we lay out this argument for mediated communication for nutrition in agriculture in detail. Our review starts with general BCC before it turns to the argument for mediated communication to reach the relevant audience directly.

1. What is BCC for nutrition related to agriculture?

Communication interventions can reduce under-nutrition because they have the ability to (1) influence the adoption of nutrition-specific behaviors or (2) advocate for programming or policy decisions taken in other sectors which have implications for nutritional status (nutrition-sensitive interventions). Of course, some successful health communication interventions already address nutrition-related behaviors. For example, there is evidence for positive effects of BCC on breastfeeding, on continued feeding during diarrheal episodes, and on introducing complementary feeding once exclusive breastfeeding is no longer appropriate. However, the current

report mostly seeks to step beyond these interventions, which can be substantially independent of agricultural decisions, and consider new behaviors which may either depend upon or be capable of bringing about changes in the food system more broadly.

Thus an addition of eggs to the diet of a 12-24 month old has possible implications for the food system: the individual family might have to keep chickens or, if they keep chickens already, may have to reallocate produced eggs from sale to consumption or, if they are not able to keep chickens, may have to reallocate income from other sources to egg purchase in the market. The market itself might have to adjust to fewer eggs available (if available production is kept for home consumption) or produce more eggs if there are additional buyers in the market. It would also have to provide needed supplies for new chicken farmers. Advocacy directed towards state government decision-makers might encourage them to support poultry farming infrastructure.

Some farming system interventions (those that seek to have influence along an agricultural value chain) that would fall under nutrition-sensitive include: household food production decisions to enhance nutrition (like planting a greater variety of crops or keeping chickens), post-harvest crop loss protection and food preservation and processing behaviors to increase food quality and availability for household consumption, and farm-level reallocation of produced foods like eggs or vegetables towards household consumption rather than market sale.

Some other examples of interventions that can affect or relate to farm system interventions include: purchase of appropriate foods to increase household members' dietary diversity (like eggs or milk), purchasing and/or using fortified foods available in the market (salt, fortified complementary foods), preparing meals with micronutrient powders available in the market, or greater consumption of underutilized local or indigenous crop resources.

Moringa, widely known as the "drumstick" tree, provides a year-round source of highly nutritious green leafy vegetables. It is commonly grown in Bihar and UP and yet, for the most part, people are only consuming the immature seed pods and not the leaves. In addition, where soy is grown, people might only grow it for sale and not for household consumption because they do not know how to process it at home. A third example is "finger millet" which has a reputation as a "poor man's food" despite being a very nutritious and hardy crop.

While the examples we use in this report focus on direct interventions meant to change behavior, BCC is often most productive when it is linked to ongoing changes in the environment. Thus, the demand for BCC may come from an agriculture focused program that requires large scale complementary education (poultry

farming expansion may require additional farmer education promoting home consumption) or food fortification programs may require complementary efforts at increasing demand, either for purchase and/or for consumption of those fortified products. The lead for such programs may come from an agriculture-focused institution, but hiring a professional communication organization for the construction of communication interventions will greatly impact the success of the interventions.

2. What is already happening in Uttar Pradesh (UP) and Bihar regarding communication for nutrition-related-to-agriculture?

2.1 A brief overview of the nutrition situation:

Chronic maternal and child undernutrition is a serious concern in Bihar and UP, not only in terms of prevalence, but also in terms of sheer numbers given their large population sizes. The most recent data on child nutrition in Bihar and UP are available from the HUNGaMA (Hunger and Malnutrition) Survey, which was conducted in a subset of 112 rural districts across 9 states of India in 2011. Overall, some minor improvements in child stunting, underweight, and wasting rates were observed nationally compared to the last national-level anthropometric survey which was conducted in 2005-06 (National Family Health Survey, NFHS). However, for Bihar and UP, more than half of the districts surveyed still showed levels well above 60% for moderate stunting. The previously reported high rates of child and maternal anemia in Bihar and UP are also of serious concern, at over 80% and 50%, respectively (NFHS, 2005-06). Unfortunately recent data on other micronutrient deficiencies (including for iron, vitamin A and iodine) is not available, but there is limited evidence to indicate a significant improvement. The overall quantity of calories consumed by very young children (related both to the quality as well as the quantity of food being provided) was also raised by nutrition experts interviewed as a key challenge for improving the nutritional status of children in Bihar and UP.

Stunting is common; although it is worse in poorest groups, it is also prevalent in wealthier districts. Household socioeconomic status is a strong predictor of nutritional wellbeing according to the HUNGaMA survey. Children from Muslim households or households belonging to a Scheduled Caste or Scheduled Tribe were also reported to be more likely to have poor nutritional status. Interestingly, the data also show that child stunting within Bihar and UP is not only associated with households of lower socioeconomic status. The lowest (best) rate of stunting reported for Bihar (in Kaimur District, which scored higher on socioeconomic rankings in comparison to other districts) was still 43% per cent. Similar observations were made for Jailun District in Uttar Pradesh (where stunting is 44%). Both of these (“lower”) levels of stunting observed in slightly better off districts, are still considered “very high” according to the World Health Organization (WHO) global classification of stunting.

2.2. Current major nutrition efforts.

Awareness of undernutrition as a key development issue appears to be increasing as local and international partners, including the BMGF, encourage state government officials to look more seriously at what can be done to improve infant and young child feeding practices and maternal nutrition. We cannot summarize all the many efforts underway by NGO agencies. However we did want to note that state-level nutrition missions have been established in both Bihar and Uttar Pradesh.

In Bihar, a state-wide, four year “End Child Malnutrition” campaign supported by multiple partners was initiated in late 2014. In UP, a State Action Plan for Nutrition has been developed with support from UNICEF and others, and partial funding to help implement the plan is potentially forthcoming under the BMFG-funded Alive and Thrive Project.

However, the involvement of agriculture sector stakeholders within the current campaign and plans in Bihar and UP to take action to address underlying food supply and access issues that impact undernutrition was not so clear. A recent situation assessment on the Challenge of Child Undernutrition in Uttar Pradesh^{vii} highlighted the need for advocacy to increase both the awareness and the readiness of agriculture sector actors to more seriously consider nutrition as a core part of their mandate in Beyond the agriculture sector, significant challenges and opportunities also appear to remain to improve the nutritional quality of food rations provided through the Integrated Child Development Service (ICDS) program (e.g. through regularizing the provision of micronutrient-fortified foods) and to improve transparency of ration provisions to the most vulnerable.

2.3 Who is doing behavior change communication now?

There is a substantial system of existing health and rural development outreach workers in rural parts of India including Bihar and UP. All of them have broad responsibilities, among which nutrition is included. Briefly summarized, they include:

2.3.1 Front line health workers:

- ASHAs undertake outreach voluntarily, although they receive financial incentives from the government for certain tasks. We were told that there are around 900,000 of these workers, 1 per 1000 population, serving 1.4 million villages. They may work in a single village or cover more than one village, depending on size.
- ANMs, auxiliary nurse midwives, work at the health subcenter level servicing a population of 5000 and are involved in vaccination campaigns and village health sanitation and nutrition days (VHSNDs) at the anganwadi centers.

- Anganwadi workers receive a stipend and are responsible for childcare for 3-6 year olds and ICDS feeding and food distribution programs for 6 month olds to 6 year olds and for pregnant and lactating women.
- Village resource persons are facilitators for women's self-help groups focused on economic issues that also provide opportunities for other development-related outreach. [A system of village level agricultural extension workers is not functioning in Bihar and UP. There are agricultural science centers (KVK – Krishi Vigyan Kendra) at the block level, but nothing currently exists at the village level. The village resource persons working through JEEViKA under the State Rural Livelihoods Mission in Bihar perform some agricultural extension-related functions at the village level, but that is not their primary role].
- One organization that is integrating agriculture and nutrition in UP is Rajiv Gandhi Mahila Vikas Pariyojana (RGMVP); they work mostly through interpersonal communication (within women's self-help groups) and not mediated communication.

2.4 Training of FLWs:

Considerable investment goes into the training of these front line workers, much of it through 'cascade' training where central trainers provide training to the next level down of trainers and so on until the front line workers are reached. We made no effort to directly assess the quality of such training efforts. However, our conversations about those outreach efforts had a contradictory quality. On the one hand, almost every group we spoke with was committed to interpersonal outreach as the mainstay channel of all communication with the population; on the other hand, almost every group also expressed substantial concerns about the quality of the ordinary outreach work. The issues included: adequacy in the quality of training and of ongoing supervision (so content knowledge and skill in influencing mothers is problematic), motivation of poorly remunerated frontline workers to do outreach, and unrealistic demands on ASHAs and anganwadi workers in terms of the number of behaviors they were expected to address and the number of times they would need to meet with mothers and others if they were to influence behavior. Overall, system and frontline capacities of government workers at the district, block and village levels were identified as significant impediments to delivering routine nutrition programs and services.

Thus we heard both a universal commitment to interpersonal communication to reach the population and consistent sharp concerns about its adequacy. Perhaps it is unsurprising, then, that much of the innovative work we saw using mediated communication was designed to address this inconsistency. Many agencies planned to use communication technology either to enhance the training of the front line workers or to support them directly when they worked with the population.

Below are some examples of programs that used communication technology to undertake one of these two purposes and included some attention to nutrition

communication; we do not include here the many programs we heard about that tried to reinforce training and outreach without incorporating communication technology.

2.4.1 Example uses of communication technology to assist FLWs.

- BBC Media Action's Mobile Kunji is a job-aid for frontline health workers that consists of a deck of counseling cards and access, via a limited number of free monthly mobile phone calls, to a prerecorded message from "Dr. Anita." To date, 65,000 ASHAs and anganwadi workers in Bihar have been trained in the use of Mobile Kunji. Mobile Kunji is designed to help frontline workers identify clients' counseling needs and deliver relevant and accurate information across a range of health behaviors related to the first 1,000 days. Mobile Kunji is being used both in individual and group counseling sessions (amplified by speakers for mobile phones).
- Johns Hopkins University Center for Communication Programs-India is conducting a small pilot (14 intervention ASHAs and 14 control ASHAs) with an audio-visual family planning job-aid. The smart-phone app allows clients to select videos that present information on family planning from different sources – a doctor, a user, an entertainment education format, etc.
- Digital Green collaborates with village resource persons and women's self-help groups to create and screen short videos on agricultural practices, income-generating activities, and, less extensively, health (in collaboration with PCI in Bihar, Digital Green created 10 videos on health behaviors central to the first 1,000 days).
- BBC Media Action's Mobile Academy is a mobile phone based in-service training course to improve the knowledge, skills, and self-confidence of frontline health workers. Interested health workers pay a small fee to access the course, take short quizzes after each module, and earn a certificate from the government when they have successfully completed the course.
- CRS has also piloted a mobile job-aid with 257 ASHAs in two blocks in UP. It differs from Mobile Kunji in that clients are registered in the app and, based on their stage in pregnancy or after, the app guides the ASHA through a discussion with the mother. The app has an audio component and doubles as a data collection tool.

These are important and intriguing efforts to upgrade the quality of training of FLWs, and to support their interactions with the population. However, they face a daunting task given the sheer size of that potential population and the likely need for repeated exposures to messages on multiple topics. Indeed there has been a recognition that such interpersonal channels do not reach the entire population.

2.5 Mass Media approaches to reach the population.

In addition to these programs meant to support outreach work through inter-personal communication channels, there are also some programs meant to reach out to the population directly using either mass media or “mid-media.”

- UNICEF is engaged in a number of communication interventions focusing on behaviors within the first 1,000 days. These include four 2-minute videos featuring movie star Aamir Khan that have been played on the television, distributed to frontline health workers, and are now being promoted for direct download through a partnership with vodaphone. In addition, UNICEF created a 500 episode television drama called *Kyunki... Jeena Issi Ka Naam Hai* (“Because... That’s What Life Is,” based on the UN “Facts for Life” publication) which was broadcast on Doordarshan and is now being rebroadcast on the regional channels. Forty-two of the episodes have been converted into 20-minute videos (and some into 8-10 minute audio clips) to be used by frontline workers as an aid during interpersonal and small group counseling. Finally, UNICEF has conducted a review of mobile interventions for behavior change in India.
- BBC Media Action’s Kilkari. Beginning in the sixth month of pregnancy, women and their spouses can subscribe (for 1 rupee per week) to receive a total of 64 weekly audio messages in which “Dr. Anita” provides timely and targeted advice on a range of maternal and child health topics.
- The Global Alliance for Improved Nutrition (GAIN) has used a social marketing approach (including TV, village banners, radio programs, street theater, focus groups, activities in schools, and audiovisual content distributed on CDs) to promote brand-agnostic fortified food products in Rajasthan and Madhya Pradesh.
- Healthphone (a multinational project sponsored by the Mother and Child Education Trust with local partners) provides audiovisual content, covering a range of health topics in one of 16 languages spoken in India, which is pre-loaded on microSD memory cards for popular low-cost models of mobile phones. Users select content to view when it is convenient/relevant.
- mKisan, a Ministry of Agriculture supported program, is an SMS Portal for farmers that enables all central and state government organizations in agriculture and allied sectors to give information/services/advisories to farmers by SMS tailored to language, crops, and location. The organization claims (in an undated publication) that 7,000,000 mobile phones are registered with the system out of 380,000,000 mobile phones in rural areas, and 1.5 billion messages have been distributed since the program’s initiation in 2013. There is also a toll-free farmer’s helpline and IVR platform.^{viii}
- Mobile Vaani is a social media platform for mobile phones that is being piloted in Bihar and Jharkand in which users speak and listen to contributions over an intelligent IVR platform, user-generated content is moderated locally and centrally and then published via IVR, and inputs are connected to government, NGO partners, and social enterprise partners. It

operates in conjunction with community radio stations and is part of Gram Vaani (“voice of the village”), a social tech company.

- Mobile vans/street theater: In collaboration with the government of Bihar’s “End Child Malnutrition” campaign, BBC Media Action has organized a rural activation campaign for complementary feeding. ASHAs and anganwadi workers mobilize community members to attend an interactive mobile van “show” comprised of games, skits, video screenings, and prizes. After the show, the animators visit marginalized households and conduct small group counseling sessions on complementary feeding using an interactive app on a tablet.

2.5.1. Other historical mediated communication programs

There are some additional historical programs in India which use mass media in an important way (although they are not specifically addressing nutrition):

- Polio Eradication Campaign. Featuring movie star Amitabh Bachchan, among others, the polio campaign had a simple message - “two drops of life” - that was broadcast repeatedly across all available channels – television, radio, print, and interpersonal – for an extended period of time. India was declared polio free in 2011. As with many multi-component campaigns, where each component plays a complementary role in leading to the desired outcome, it is not possible to attribute this success to the media component in isolation.
- Radio and television programs for farmers. There is a 24-hour television channel for farmers (DD Kisan) that broadcasts in multiple languages and All India Radio also has programs for farmers. These programs may have call-in features and provide information for the toll-free farmer’s hotline. There is also a web-based platform called Krishak Jagat. However, the actual reach of all this farmer-directed programming and the usefulness to farmers is not well understood.
- Television and radio serial dramas. Population Communication International ran a number of television and radio serial dramas for family planning including Hum Log (TV, 1985-87) and Tinka Tinka Sukh (radio, 1996-97). BBC Media Action’s television serial, Jasoos Vijay (2002-2006), featured an HIV-positive crime fighting detective. The evaluation of Jasoos Vijay found effects on intermediate outcomes like knowledge, awareness, and discussion of HIV/AIDS, but limited effects on condom-use behaviors.^{ix}

2.7. Why isn’t this enough?

There is serious work underway and some of it appears on its way to state-level diffusion. We have been impressed by many of the projects we have seen and we recognize that we do not have full details about their accomplishments. So why consider additional work?

- The evaluations of some of the programs are not yet complete, thus we cannot yet assess whether they have proved effective in influencing behavior at the population level. An important challenge with some BCC projects is

that they count number of people who had any contact with the outreach channel and/or look at knowledge change rather than behavior change as the primary outcome variable. This makes it difficult to genuinely assess their effects.

- We are concerned about the carrying capacity of programs which depend entirely on effective operation of interpersonal channels:
 - Expansion of these programs to state-wide scale may suffer from quality degradation when they depend on routine cascade training and supervision of front line workers.
 - Even were they to operate in every village, enroll the majority of the target populations, and do high quality work, the amount of time they would be able to spend on nutrition messaging would be limited. We will argue below that adoption of many new behaviors will rely on repeated exposure to messages; this may not be possible for front line workers who have many mothers to talk with.
 - In many cases, behavior change will require something more than individual persuasion of a mother by an ASHA. It may require broader social norm change so that fathers, mothers-in-law, and neighbors all accept and support changes in behavior. It may also require that resources be allocated at the state and district level to support needed changes (e.g., inclusion of fortified foods as part of the ICDS, investment in market infrastructure so as to ease access to needed foods). Both local social norm change, and broader policy change may be accelerated if awareness of nutrition issues becomes widespread.
- Almost all the program examples we describe above dealt with non-nutrition behaviors (e.g., for health - adopt a family planning method, deliver your baby at a health facility; for agriculture - compost, plant certain seeds, etc.) or nutrition-specific behaviors without relation to the food system (e.g., exclusively breastfeed, give complementary foods at 6 months). Programs which have a focus on improving nutrition outcomes in the context of the food system are largely undeveloped.

3. What could a BMGF investment in communication for nutrition-related-to-agriculture achieve?

A successful program would want to satisfy three distinct objectives.

- Show that a communication intervention was able to influence behaviors known to reduce stunting or other nutritional deficits.
- Create a model of intervention which (a) includes a method for assuring adequate reach and frequency of exposure (likely using media), (b) is able to develop persuasive messaging, (c) is responsive to the quickly evolving media landscape provided that the new technologies can be applied at scale, (d) is guided by systematic and frequent feedback about intervention effects to respond to the

changing behavioral landscape, (e) is scalable at acceptable cost, and (f) which will be continued by other institutions once BMGF funding was ended.

- Develop a communication institution that is or will become capable of supporting BCC for other behavioral outcomes, and working with other partners in furthering their behavioral goals.

The program as it evolves will need to reflect a good deal of additional investigation of the candidate behaviors and their context, the nature of alternative communication channels and their ability to reach the target audience, and what content of messages ought to look like if it is to be persuasive for this audience.

In the following sections we address four overlapping questions: What behaviors should be considered for this program? What are the core elements that we think should be incorporated in the intervention? What are the organizational alternatives for implementing the program? What are the arguments for and against mounting the program in India?

4. What behaviors should be considered for this program from a communication perspective?

4.1 Choosing target behaviors for an intervention should reflect four considerations:

4.1.1 What is a behavior?

Is the candidate behavior, in fact, a behavior? Sometimes there is confusion as to what constitutes a behavior. Reducing stunting among children under 5 is a goal, but not a behavior. Increasing dietary diversity is a category of behaviors, but not a behavior. A mother (or other caretaker) feeding a child aged 6-24 months one egg every other day is a behavior. It specifies a volume of behavior, the individuals who are to undertake it, and the frequency with which it is to occur. Sometimes multiple behaviors must be performed in order to achieve a desired outcome (plant a variety of vegetable seeds in a home garden; feed, weed, protect the crops; store them safely; prepare them appropriately; feed them to your child repeatedly.)

4.1.2 Is there evidence that the candidate behavior is causally related to a nutrition deficit of concern?

While a particular campaign should be held to a requirement that it affected the behavior in a substantively important way (not just statistically significant), it may not be possible to show that the campaign has affected a target nutritional deficit such as stunting given the need for larger samples, more time, or changes in

contextual factors to show those outcomes. However, the decision not to measure stunting or iron deficiency, for example, as part of the programs' monitoring and evaluation requires that there be solid a priori evidence that the behavior that is the campaign focus has been shown to affect the nutritional goal. For example, there is evidence that routine consumption of iron-fortified flour can help reduce anemia among women and children, thus measuring a behavioral outcome (such as frequency and quantity of consumption of foods prepared with fortified flour) would be sufficient for the purposes of the program recommended here.^x

A communication program would not be expected to do original research to establish the value of a nutritional behavior. A communication program should not be responsible for experimental trials of basic nutrition propositions. However, it would want to demand solid evidence from nutritional experts as justification for launching a campaign meant to bring about larger scale behavior change. What sort of evidence would support the claim that a behavior is worth trying to change?

a) Evidence from previous experimental trials where the behavior is introduced (e.g., one more egg a day for 6-24 month olds) and decreased nutrition deficit is the outcome.

b) Non-experimental evidence that the behavior is associated with lower levels of the nutritional deficit, where research design features and/or statistical analyses address likely threats to inference (e.g., an epidemiological study where children with eggs in their diet are less stunted or have less iron deficiency than children who did not consume them).

c) There is a plausible biological argument for a mechanism leading from the behavior to deficit reduction (e.g., consuming more iron rich foods reduces iron-deficiency anemia).

This evidence will be a stronger foundation for justifying an intervention if it is drawn from a place and a population with the focus nutrition deficit

4.1.3 Is the candidate behavior easy or hard to influence with a communication intervention?

There are some behaviors unlikely to be affected by a communication intervention, either because they are too complex or too embedded in the material or cultural circumstances of the target audience to be influenced by a communication intervention. That low likelihood of success is magnified if the communication intervention is not long lasting or intense. The program would need to look for behaviors that are relatively straightforward. Behaviors seeking to change deep rooted gender-related dynamics within the household, such as who controls the money earned from a home-grown cash crop or whether a pregnant mother receives an egg at mealtime instead of her husband, are likely to be much more difficult to change. Similarly, changing behaviors related to what farmers grow, what animals they keep or what foods families normally eat in what quantities, may also be challenging to change due to economic, cultural, as well as access barriers.

Rogers outlines 5 characteristics of innovations that make them relatively more likely to diffuse. These include 1) Relative advantage: that new behavior has substantially greater benefits than the current behavior; 2) Compatibility: the new behavior does not require substantial changes in one's routines; 3) Complexity: the new behavior does not require many steps; 4) Trialability: It is possible to test out the new behavior and still return to the prior behavior; 5) Visibility: that the benefits of a new behavior can be observed in the short run. While Rogers uses these criteria to characterize innovations which are likely to be adopted more rapidly, each of these characteristics also helps to define behaviors more open to influence by a communication intervention. Rogers, E. M. (2010). Diffusion of innovations. Simon and Schuster. We also add two more criteria which we see as particularly relevant in this context: the need for new or reallocated resources and whether it requires frequent performance.

4.1.4. Are communication interventions designed to support newly available products or products available under new arrangements in the marketplace?

Social marketing typically links communication efforts to new or newly designed products (e.g., fortified wheat flour) or products now more accessible in a place closer to home (such as iron folate tablets newly available from *aganwadi* staff) or products with changed prices or purchase-ability (eggs available in smaller packs). Communication interventions complementing changes in the other elements of the marketing mix (product, pricing, distribution) are also likely to be more successful, than when communication is the only operating component of the intervention, because they address environmental and structural barriers in tandem with attitudinal barriers.^{xi}

4.2 What are some candidate behaviors?

We are not able to definitively recommend a behavior (or a series of behaviors) that should receive highest priority at the outset of an intervention. The literature we reviewed and experts with whom we spoke were readier to address goals (reduced anemia) and behavioral categories (dietary diversity among pregnant and lactating mothers) than they were to advocate for specific behaviors. This is a task to be taken up by nutrition and behavior experts collaborating with the implementing agency.

Still, we do seek to identify some plausible examples of categories of behaviors that the literature and experts found promising, assuming other causal factors (such as sanitation) are being addressed concurrently. We came up with the following four behavioral categories:

- 1) Increased consumption of higher quality diets by women of reproductive age (15-49 years);
- 2) Increased consumption of higher quality diets by children under-five;

- 3) increased consumption of higher quality diets by households (general); and
- 4) Increased consumption of iron rich foods (including supplements) by women of reproductive age.

With these behavioral categories in mind, our next step was to identify examples of specific behaviors that have the potential to influence the outcomes selected. We considered behaviors related to individual or household level consumption of nutritious foods, as well as those which affect household level production of or access to more nutritious foods. We also considered examples of behaviors that influence how food is distributed within the household. An additional consideration would be what complementary innovations in the areas of agriculture or other sectors are taking place locally, so the communication intervention would plan to work in a complementary or supportive way with those interventions. It is important to recognize that these are illustrative and that we are not making any concrete recommendations about which behaviors should be chosen, rather about how one might go about choosing behaviors that are associated with the behavioral goal (e.g. reducing stunting) and amenable to change through communication.

We assessed some illustrative behaviors in Table 1 against the Rogers+2 criteria referred to above. A score of 3 was given if the outcome was viewed as being very feasible and a score of 0 was given if the outcome was viewed as not being feasible to achieve.

Table 1: Viability of behavioral adoption

	Perceived relative advantage	Compatibility	Low complexity	Triability	Visibility	No extra resources needed	Fewer decisions needed	CONCLUSIONS
1. Plant vegetables and feed them to your family	2	2	1	1	1	1	1	Lowest feasibility (inputs, \$\$, land and complexity are key constraints)
2. Feed an egg to your child U5 every day	2	2	3	2	2	2	2	Moderate feasibility (access and \$\$ are key constraints)
3. Add the "iron-fish" to your cooking pot when preparing food for you child U3 (if product was available)	2	2	3	3	2	2	2	Moderate feasibility (access and \$\$ are key constraints)

Each candidate behavior would be judged against each criterion, largely subjectively. We make such tentative judgment in Table 1, but use them more as illustration than as defensible judgment. In this analysis, while the three behaviors may not be currently seen to have strong perceived advantages by the audience, it is likely that through communication they can be associated with outcomes that are valued (e.g. child's intelligence or avoidance of illness; easier pregnancies.) The iron fish would be easy to try and either reject or adopt, but growing a home garden may make demands that are incompatible with currently available time, and is not so quickly tried and then adopted or rejected. Example 1 presents the highest barriers and the greatest burden on the family and the mother. Example 2 is the easiest to perform, but may be constrained by household finances or socio-cultural perceptions about the appropriateness of feeding eggs to young children. The third behavior, purchasing a small iron-fish (or other shaped piece) to add to the family cooking pot to reduce iron deficiency may be the easiest case to be influenced by communication. Experience with social marketing shows that simple, low-cost products can become highly valued products. The ability of the mother to re-use the iron piece multiple times adds to its value and selling potential. Having a product also opens the door for local private sector participation, using local distribution networks.

We have only begun this process of considering what target behaviors should get priority. While our conversations led to some confidence in priorities about the audience (pregnant and lactating women; children under 5) and outcome categories (iron anemia reduction; increased range of foods consumed) the rest is only speculation about what might be feasible. Any intervention agency will need to consider alternative behavioral foci in the context of each of the specified criteria: specifically, what behavior is recommended, evidence for its effect on nutritional deficits, likely responsiveness to a communication intervention, and the possibility of linking communication to product introduction or change in its availability or price.

5. What are the core elements that should be incorporated into the program: the exposure strategy?

5.1 What is the exposure strategy?

The goal of any exposure strategy is to define who the audience is, what proportion of them will be reached with messages and how often and over what period(s) of time. An exposure strategy defines the mix of channels to achieve those exposure goals. We begin with considerations about the basis for choosing an exposure strategy.

There are three distinct categories of audiences for communication: policy makers at a national, state or local level who can affect the environment for making pro-

nutrition decisions; people who form the social network of a person who has to engage in a recommended behavior and who can support or undermine behavior change, and then the individual who is to engage in the recommended behavior. A particular communication program can address all three of those audiences or one of them, reflecting an understanding of what constrains behavior change.

The choice of an exposure strategy will depend on assumptions about the audience, its openness to change, and what the expected process of influence is. There is some information that will spread rapidly even if it does not reach individuals directly (the victor in a political campaign, gossip about important celebrities). There is some communication about some health behaviors that will influence behavior even if only heard once or twice (in some countries putting babies to sleep on their backs to avoid SIDS spread quickly.) But for many behaviors, a carefully constructed exposure strategy may be needed for messages to affect behavior.

5.2. Is the target audience active or passive?

Is the audience actively seeking information to solve a problem, and thus primed to adopt a new behavior, or is it passive in the process -- not recognizing a problem (e.g., a child's short stature) or not actively looking for a solution? If a parent is concerned about a child with a fever, and is seeking solutions for that fever, a single exposure to a message about effective treatments for fever, even if the parent has to seek out the source (e.g., from a village health worker), may still produce quick adoption of a feasible recommended treatment. There may be little need to reach out to the mother since she is seeking information. In contrast, the diffusion of a behavior (e.g., adding 2 more food groups to a child's daily diet) which is not already seen as solving a recognized problem will likely demand reaching out to a parent; it may require multiple exposures to a message and through channels which reach a passive parent even if he or she does not seek them out.

5.3 What content needs to be heard?

If a behavior is seen as largely contingent on learning a set of benefits of that behavior, then fewer exposures may be sufficient. For example, if the decision to take an iron folate tablet during pregnancy only requires understanding the specific benefits of those pills and where to obtain them at no cost, then even a few exposures to that information might allow the benefits to be understood and the behavior adopted. If, in contrast, an existing behavior is embedded in a social norm, then higher doses of exposure, with repeated messages arriving through multiple channels, may be required. For example, a pregnant woman's eating extra food may reflect her recognition of its benefits, but also may require that her spouse, mother-in-law, and others in their social network support that reallocation of scarce resources. Their normative preferences about this behavior may be more likely to change if they hear the message from multiple credible sources, repeatedly, and others in their community are passing on the message as well.

5.4. How does intense messaging work?

A BCC intervention has no chance of changing behavior if the messages do not reach the target audience and, most of the time, one exposure is not enough; the target audience has to be exposed to messages repeatedly. The necessary frequency of messaging depends on the complexity of the behavior and audience motivation. For complex behaviors like those related to agriculture and nutrition, reaching members of the target audience once or twice is unlikely to affect behavior. As a point of departure, we recommend that the target audience should be exposed to messages several times a week, from a variety of sources, for an extended period timed to match periods when the audience is making decisions about the behavior.

One area in which the comparative advantage of intense BCC messaging has been explored is with regards to tobacco communication. Two reviews of anti-tobacco mass media campaigns found that campaigns of longer duration and higher intensity appeared to be associated with greater declines in smoking rates (with the caveat that campaign differences limit the extent to which results are comparable across studies).^{xii} Dose-response relationships (more exposure associated with more positive outcomes) have also been reported in the evaluations of a number of mass media campaigns in the areas of tobacco, HIV, family planning, and diarrhea.^{xiii}

Overall, intense messaging (multiple exposures through multiple channels, maintained over time) may produce effects for reasons over and above its transmission of information about a recommended behavior or even about specific benefits: multiple exposures will give individuals more time to process the messages and learn about the ideas behind the behavior; multiple exposures through different formats will make it more likely that people will hear the message from a source and in a format that he or she finds persuasive; hearing a message frequently may carry an implicit meta-message that the behavior is socially expected; frequency may increase the likelihood of subsequent social discussion about and diffusion of the ideas put forward; frequent and repeated availability of messages makes it more likely that individuals will hear a message when they are ready to consider change.

The argument here is for an exposure strategy that is responsive to a particular behavior. This is not, in principle, an argument for the use of electronic media as a channel. In India, as we noted above, all agencies we spoke to were clearly committed to the use of interpersonal channels as a primary means of reaching their audiences. But, as we also noted above, our interviews with many of the operating agencies left us with concerns about the quality and quantity of information being diffused through existing interpersonal channels. There may be little likelihood that a range of nutrition messages can be added to the front line workers' task list if they are the only diffusion channel. The training, retraining and supervision of those front line workers is hard to accomplish at scale and with speed; also, there are too many messages to be diffused and too few opportunities for contact to permit effective diffusion through those agents alone. Our argument here is that any

effective intervention should be linked with available interpersonal channels; however, it needs to push beyond those channels.

5.5 How can one complement interpersonal channels with media?

There are three ways to think about complementing interpersonal networks with mediated channels. There are specific examples of each of these strategies in our list of examples above.

- Media can be used to reduce the reliance on cascade systems of training. Media can accelerate the speed and solidify the quality of training that existing front line workers receive. The BBC-Media Action Mobile Academy program is an example.
- Media can be used as learning aids to support the interactions of front line workers with the population. Digital Green's use of short videos to support the work of village resource persons working with women's self-help groups is an example, as is BBC Media Action's Mobile Kunji program.
- Mass media can complement interpersonal channels by echoing those channels and add credibility to the work of the FLWs.

Each of these uses of mediated communication promise to enhance the quality of existing interactions that front line workers have with the population, but they may not resolve issues with the reach and frequency of such interactions, nor reduce the competition among nutrition, health and other issues for the workers' time with individual women or families.

5.6. How can media be used to reach the population directly?

Media can be used to reach the population directly, in part as a complement to front line worker efforts. If the workers are able to reach audience members directly, then the mediated messaging provides a legitimating context to their work, and repetition of exposure adds additional opportunities to learn about the behavior and its benefits, and may reinforce social expectations and changed social norms. If the audience members are not reached by the front line workers with information about a given behavior, which may often happen, then media diffusion can provide some exposure to those messages. Media may not be as effective a transmitter of information as a well-trained, responsive, knowledgeable front line agent who can respond to individual concerns, but it can be valuable when there is no agent to play that role or the available agent is less skilled. We see such direct use of media in some of the examples above, including UNICEF's videos with Aamir Khan, radio and TV serial dramas, including those by Population Communication International, GAIN's social marketing of fortified foods, and DD Kisan, a televised farmer channel. Many of the people we spoke with expressed admiration for the successful Polio Eradication Campaign, where large outreach efforts were complemented with intensive television and radio broadcasting.

6. What are the core elements that should be incorporated into the program: What media channels are available and who has access?

For the reasons explained above, there is strong justification for developing media exposure strategies as a complement to existing interpersonal channels. But a difficult issue is unresolved: how much do media channels actually reach the rural population? Published data for Uttar Pradesh is out of date; we mostly rely on a 2008 report, which itself relies on both a 2008 survey and the 2005-2006 National Family Health Survey. In Bihar there is some more up-to-date information gathered in a 2011 survey related to the Ananya project.

6.1. Evidence about mass media access.

In all studies there is clear evidence that media access varies sharply across districts within each state and among populations groups. Thus, in 2008 in rural UP, it is reported that 8% of the population is reached by print media, 20% by radio and 21% by television. While radio reaches about the same proportion of the population across districts, TV varies from 16% to 36%. In a separate analysis for all of rural UP, about 18% of non-literate men and women have access to either radio or TV and about 60% of men and women with 9+ years of education have access to one of those sources.^{xiv} The 2005-2006 data from UP put regular exposure to some media (at least once per week for radio, TV, print) at 77% for men and 47% for women, but this does not separate rural and urban populations. A similar analysis for Bihar, puts state-wide media access at 58% and 27% for men and women.^{xv} A later, but less definitive study (2008), puts access to TV, radio or a print source among rural women at 24%, with television having the largest audience.^{xvi}

Access to media is constrained by availability of electricity, costs of ownership, broadcast reach, gender roles related to media access, time to make use of media, and possibilities for socially shared use of media. The survey data are out of date and, in any case, may not capture a dynamic situation where mobile phones (possibly including some with more features) are spreading, where television is more attractive to people than is radio, and where a long history of government dominated broadcasting is giving way to a still developing privately owned system including regional FM radio stations. It may also be possible to take advantage of alternative ways to make use of media in villages.

6.2 A number of ongoing projects make use of 'mid-media'.

These include two different categories of channels. One category is comprised of mobile vans with video capacity and street theater. These involve travel from village to village to present content, sometimes in coordination with front line workers or other village resource people. While exposure to either of these channels may be

effective if they reach an audience, it is unclear to us how they will resolve the reach and frequency issue at an acceptable cost. Given the sheer number of villages in Bihar or UP, and the cost of maintaining vehicles and drivers or to pay theater performers, it is difficult to project these channels as cost-feasible. The second category that may fall into mid-media includes more conventional methods of information diffusion like billboards, wall posters/paintings and other similar materials which might be set up in a village site and kept there for an extended period as an additional reminder about a recommended new behavior. There may also be loudspeaker systems in villages which may be possible to employ.

6.3 Rapid change in the media environment.

It is well understood that this is a dynamic period of media development and while that is particularly true for urban middle class audiences, rural areas may not be left entirely behind. There are a variety of other uses of media already in play that require active outreach by users but an intervention agency might want to consider as models:

- There are radio programs that make use of regional FM stations;
- There are said to be television sets in village level Panchayat buildings which might be used for local CD distribution and playing of serial dramas or other videos which would attract audiences and carry nutrition messages. Some of our interviewees expressed skepticism about whether these TV sets were actually available.
- There are IVR systems through which individuals can request particular information via mobile phone.
- There are streaming radio channels (notably one supported by Unilever and another by Mobile Vaani) where callers can use a system of missed calls to obtain free access via mobile phone to entertainment channels or news and information channels with interspersed ads.

There is rapid change in the shape of the media environment and the technologies available, although at a different pace for rural and urban environments as well as for women and men. It would be expected that a program be both able to take advantage of the technologies now available and be responsive to the changing media environment, designing for the future given the dynamism of the environment.

6.4 What to do if exposure needs do not match media access?

What is the program to do if its interventions require a high level of exposure but its preferred audience cannot to be reached with adequate frequency to expect success? There are four choices: do not do communication because it cannot address the issue; do communication but with a reduced expectation of success; limit the use of communication as a complement to another change in the material environment for the preferred audience (newly available fortified foods); or use

communication to reach an audience that is accessible and able to adopt the new behavior. For example, this final choice may mean looking at a population with a high level of stunting, but which is reachable through media, and which has some resources to be able to undertake recommended actions. The findings of the 2011 HUNGaMA report indicate that radio access varies significantly by district within UP and Bihar and, as mentioned previously, districts with higher socio-economic status (and radio access) still appear to have very high rates of child stunting. This strategy recognizes that it may be worthwhile to reach the somewhat poor, even if the poorest of the poor cannot be the primary audience. Communication in isolation is unlikely to resolve a problem reflecting a deep structural flaw, even if it can help better the lives of those who are in need.

7. What are the core elements that should be incorporated into the program? What should the process be for shaping the content of messages?

In an earlier section we described some of the issues around choosing a behavior. Here we assume that a specific behavior or set of behaviors have been chosen, and the exposure strategy has been defined, and the issue is what messages will be diffused through the various channels.

7.1 How to choose message themes?

Rarely will didactic messages (“feed an egg to your 6 month old”) be persuasive unless the audience is already actively seeking a solution for a recognized problem. Then, a major task for communication content developers is to recognize what the range of possible arguments for (or against) a behavior might be and then develop an approach for choosing which of them should be given priority as themes for communication content. For example, a mother feeding an egg to a child might be influenced by a belief that it will reduce stunting, that it will make a child smarter, that it will make a child less vulnerable to illness, that her husband or mother-in-law approve, that the child will be able to digest the egg, that she can afford to include daily eggs in the child’s diet, that reallocation of scarce food resources from other members of the family to the young child is acceptable. Each of those beliefs represents a possible theme for communication content. Communication interventions need to explicitly recognize the alternative belief themes that might be targeted and develop empirical approaches for choosing among such themes and making new choices as audiences evolve.

Our team members have particular experience with survey-based approaches. One way to choose message themes is to compare individuals who do and don’t do the behavior currently and then choose messages themes that reflect beliefs that differentiate the two groups. This sort of message theme analysis can suggest which themes to incorporate into messages, preferring beliefs that are most related to

behavior, are not already widely accepted, and which seem likely to be open to communication interventions. Any implementing organization should have experience undertaking this task and may have its own preferred approaches.^{xvii}

7.2 How to create content about chosen message themes?

Shaping message content has two complementary aspects: the choice of belief themes just described and the creative realization of those themes in communication materials. It is very likely that the creative decisions made in developing specific messages will affect their persuasiveness. These include: message clarity in presenting the argument and recommended behavior, the memorable-ness of the message, its emotional resonance, its match with the lives of the audience, and other factors which affect audience engagement with and retention of messages. Creative effectiveness may permit some reduction in exposure intensity. The content of more effective messages may be remembered better than content in less engaging messages and also may be more likely to be shared with others. Unlike choice of message themes, which can rely on empirical formative work, maximizing message engagement starts with creative work and is likely to require reliance on professional communication developers, working in concert with technical experts, and repeated pretesting with the target audience.

7.3 Will the program be scalable?

In choosing its behavioral targets, its exposure strategy, and its message strategy, the program should offer a model that is scalable at acceptable cost. While the initial program will likely not cover the entire state of UP or Bihar during the current funding period, it ought to be designed with an eye towards its full expansion. Its components need to be manageable from logistic and cost perspectives as it operates on a limited scale and also if it operated at full scale. For example, particular interpersonal channels can be incorporated only if there is a clear and cost-acceptable way of incorporating them at the state level. Provision of batteries for audience members' personally owned radios will only be acceptable if there is a way to manage those costs at the state level. Delivery of serial drama episodes by hand to every village on a weekly basis, which may be feasible for a smaller scale program, can be incorporated only if there is a path to managing it on a state level.

8. How will the program know how well it is doing?

Face-to-face communication can sometimes rely on observed reactions of the receiver of a message to assess whether the message is getting through (although much research on clinician-patient communication casts doubt even on the legitimacy of that assumption). However, we are emphasizing the use of mediated channels in this report. When content producers are at a distance from their

audiences, as with mediated communication programs, they lack that opportunity for observing immediate reactions. They need to construct feedback systems that permit systematic feedback from the audience on a regular basis.

8.1 Formative Research

Many mass communication programs have incorporated quite substantial formative research components to serve as background to program planning; they can spend a year or more doing such background research. Given the uncertainties about what specific behaviors are worth addressing and which media might reach the relevant audiences, there will be a definite need for some formative research in this program as well. That should be limited to research which supports the specific choice of behaviors and of media. However, systematic monitoring and surveillance during actual operational periods are often much less robust and are not always able to incorporate the information gathered into program modifications on a constant basis. It may be that resources spent on systematic evidence gathering while a project operates can more effectively shape the evolution of the program than extensive formative research before a program launches. Such monitoring research may provide more information that is actionable by the operating programs.

8.2 What would the feed forward/feedback system do?

The effectiveness of a communication system will be linked to its ability to know its audience and know how its audience is changing in response to program actions and other context changes. Some of the knowledge gained will be the basis for program development even before messages are transmitted (feedforward) and exemplified by (a) and (b) below. Some of the knowledge will be assessments of the audience response to the messages being transmitted ((c), (d) and (e) below. Here are some examples of the sort of knowledge which would guide program decisions:

8.2.1 Feedforward examples:

- a. Know on a continuing basis how the context of its audience is changing. For example, if one recommended behavior is to add-in other ingredients to a six month old's porridge, using knowledge about whether the items are available at an acceptable price in the market or from a home garden, one can modify the messages accordingly.
- b. Know about what arguments are likely to persuade individuals to adopt a specific behavior (e.g. are they more persuaded by claims of nutritional benefits, by assurances that the behavior is culturally or religiously permitted, by social expectations – that others similar to them are adopting the behavior, by learning about the ease of adopting the recommended practice, or by learning the skills and feeling confident that the action can be taken?)

8.2.2 Feedback examples:

- c. Know about how much exposure to messages is occurring and through which program elements it is being achieved.
- d. Know about whether messages are actually understood in the ways they are meant to be understood.
- e. Know about whether behaviors (and the beliefs that underlay them and which may be the immediate targets of messages) are moving in the right direction.

There are a variety of ways that such a feedforward/feedback system might be realized. A conventional approach would be to use frequent (every 1-3 months) surveys with the target audience; however, given the costliness of such a survey system other mechanisms ought to be actively explored. The design of such a system will take careful development and the costs of such a system would be substantial. Consideration about alternative means for obtaining good information (through mobile phones for example) will be important. However, such a system must be designed to avoid bias in the sample (by using only listeners, or a convenience sample) and avoid bias in the way questions are asked (to avoid merely getting reassurance that all is going well).

In our interviews we heard about several types of feedback systems that are currently operating. In some cases current staff, sometimes including script-writers and producers as well as field operational staff, make regular visits to field sites to hear about how audience members are responding to programs. In other cases, field agents are required to upload information electronically about adoption of recommended behaviors among audience members. In other cases (Mobile Kunji, the CRS mobile pilot, and Mobile Vaani), the mobile phone applications themselves are being used to collect data about exposure and behavior. We think these approaches can serve as foundations for the sorts of feedback systems we argue are appropriate. Without being able to see the existing systems in full operation, we may not fully appreciate how well they are working. In particular, we found it difficult to separate supervision functions which might establish which geographic locations and field staff need extra attention and program monitoring functions meant to shape the exposure and message strategies of the program, more generally. We note that while focus groups and other qualitative methods may provide important insights/hypotheses about what is happening and why, they are not alternatives to a systematic quantitative system.

There is some risk that such feedback systems will generate large amounts of data, but have little influence on the evolution of interventions. The capacity to formulate management decision alternatives and specify what results will support which alternative has to complement the development of the data collection system. The success of this sort of feedforward/feedback system would be largely dependent on the ability of project staff to both outline issues that can be addressed through this system and be able to analyze and interpret data coming from the system in a timely way to suggest changes in direction for the operational program. It is also likely that the simple evidence about whether or not the audience is changing in the intended

direction will not always be sufficient to make it clear why an expected change is not happening, nor what can be done about it. The capacity to do follow up research to sort through possible explanations and their implications for program decisions will also be of value.

9. What should the implementing agency be able to do?

The implementing agency would want to both implement a specific intervention consistent with what is described in these pages and, at the same time, build an institution capable of serving the communication needs of other partners.

9.1 Implementing a specific intervention: What would the intervention institution be expected to do?

- a. Choose a focus population/geographic area of focus
- b. Choose a behavior (or behaviors): Undertake research to determine which among candidate behavioral targets should be chosen – understand the promise of the behavior to influence nutritional status building on local food systems, the context of performing the behavior, the influences on the behavior that might be addressed by communication.
- c. Develop an exposure strategy that promises to produce high levels of exposure, both reach and frequency, to the message. Ideally the average person will be exposed more than once per week – although this will vary with the behavior - rather than once or twice per year.
- d. Develop a content development strategy to both choose message themes and create content.
- e. Design a feedforward/feedback system that assures that campaign decisions at the formative (including themes) and at the operational stages are responsive to systematically gathered evidence from the field.
- f. Operate in a way that would both maximize the effectiveness of the program and also permit credible evaluation by an independent agency (which might involve some systematic variation in the implementation of the program across geographic units or over time).

9.2 Building an institution capable of serving the communication needs of multiple potential partners. What would the intervention institution be expected to do?

There are other agriculture focused programs supported by the BMGF as well as programs supported by other institutions which are tasked with incorporating

nutrition communication goals. They may intend to do behavior change communication as a complementary activity to their primary value chain related work, but may not have the expertise to develop or implement a promising BCC program. Along with its efforts to independently implement a first effort to affect nutrition-related-to-agriculture behaviors as described above, the communication program would seek to develop a capacity to sell its services to other institutions with complementary interests, including government institutions. In addition to the skills outlined above, there would also be a need to gain expertise in client service and in how to operate in a fee-for-service environment. The agency would also likely want to build links with other communication agencies (regional advertising or marketing groups, for example) to enable quicker and more effective implementation.

If the agency charged with taking on this role had ample experience in doing communication in this area, it might be able to take on work for other clients early in its evolution. If it wanted to establish its own expertise and ability to influence behavior independently before taking on that task for partners, it might put off such collaborative work until a later point in its development.

10. What happens when BMGF funding ends?

Under what circumstances might the program be continued by other institutions once BMGF funding was ended? In the best case, the evaluation of the program shows success and shows that important behavioral gains can be achieved through communication and with an operational model that promises to be both logistically and financially reasonable given the apparent benefits. State government would choose to implement the programs on a state-wide basis. That has been the model for BBC-Media Action's Mobile Kunji and Digital Green's video outreach. Achieving that next step requires that the purposes of the program fit well with the government agenda and that the budgets and logistic demands are acceptable. Recognizing that nutrition is not yet a priority for state agriculture sector actors in UP and Bihar, it is unrealistic to expect the agriculture state ministry to prioritize funding for agriculture-nutrition communication programs in the short term. Nonetheless, the quickly growing mobile phone based mKisan platform might suggest one route to collaboration. Also, health and rural livelihoods institutions may be more receptive to add-on collaborations. Recognizing existing constraints and differences in the readiness and funding capacity of different state ministries, the program operator will need to ensure constructive working relationships with state government counterparts (agriculture, health, women and children, food and public distribution, etc.) from the program start and actively pursue partnerships so that objectives of other constituencies are engaged by the program.

11. How would the program be evaluated?

11.1 Behavior as an outcome, not knowledge and not nutritional status.

The intervention needs to be designed in such a way that it can show meaningful behavioral change in the period of funding. This means that program must be designed to affect behavior and that it be implemented so that it will be possible for evaluators to show that it affected behavior.

This focus on behavior is an important decision:

- (1) BMGF needs an intervention designed to and tested as to whether it affects behavior. It is not enough to show that it affects knowledge or beliefs or perceived social norms (although these might be secondary outcomes.)
- (2) It would be desirable but probably unreasonable to require an effect on actual nutritional status among the target population. Here are the concerns about focusing on nutritional status:

- (i) The obvious outcome for a child-focused intervention would be stunting; nonetheless, this would be a difficult criterion to satisfy. Influencing a single behavior alone (such as feeding an egg a day to a child), will not necessarily lead to reduced undernutrition due to the complexity of its underlying causes, including household and family factors (e.g., inadequate sanitation and water supply), inadequate complementary feeding practices (e.g., low dietary diversity), breastfeeding (e.g., early cessation) and infections (e.g., enteric infection and inflammation of the gut)^{xviii}. Many of the sorts of interventions described here affect stunting only when they are complemented by other multi-sectoral interventions (like sanitation improvements to reduce infection); when done in isolation they are unlikely to be able to show effects.
- ii) Also, given that stunting is further down the causal chain than behavior, it would take a (substantially) larger sample to have enough power to assess nutritional status rather than behavioral effects and that may be impractical.

- 3) However, in order to justify the use of behavior rather than nutritional status as an outcome, it would be important to have credible evidence that the specific behaviors being advocated are causally related to nutritional status. Ideally that would be locally produced evidence; realistically, it may be evidence from places in parallel contexts.

11.2 What sort of evaluation design, and who would implement it?

We believe that the summative evaluation of the project should be undertaken by an institution independent of the implementing agency. The pressures for an implementing agency to declare success are too strong for it to be able to evaluate its own work. Still, there is value in considering how to maximally integrate the

feedback system described above with the data collection for the summative evaluation. Until the program is designed, including its behavioral focus, its exposure strategy, its relationship with partner agencies, and the extent to which it is attempting to complement other changes in the material environment, few specific suggestions about design can be offered. However, it will be important for the evaluation group to be experienced both in evaluating public health outcomes, and to recognize the special issues in evaluation when communication interventions are central.

Elsewhere, one of the authors has elaborated some of the special issues that communication program evaluators face and described some of the evaluation designs that have proved useful in establishing behavioral effects.^{xix} In collaboration with the implementation agency, the external evaluators will want to consider these designs:

- Cohort designs following the same respondents (or successive representative samples in the same villages) with multiple times of measurement before and after the initiation of the program,
- Comparative cohort designs incorporating ongoing measurement in locations where the program is more and less likely to reach the intended audience frequently, because of natural differences in availability of media channels.
- Manipulated exposure designs where sets of villages which can be shown to be comparable during a baseline period are provided with different levels of exposure over time (perhaps through an arrangement with a limited access local broadcast FM station) with multiple measures before and after program introduction.
- Time series designs involving very frequent measurement in a set of villages where exposure can be introduced and reduced in a controlled way across time.
- Switching replicate time series designs where two sets of villages are subject to very frequent measurement and each serves as the control area for the other as message exposure is introduced and reduced during periods of time on a different schedule for the two sets of villages.

All of these examples share a core set of strategies: working in a realistic context rather than in a laboratory or overly controlled setting, making multiple comparisons where access to the intervention varies over time and/or across geography, and employing frequent measurement starting well before program initiation.

It is not likely to be feasible to implement a useful randomized controlled trial. Cost considerations, implementation barriers, mismatch between an evolving implementation program and a fixed evaluation approach are likely to make RCTs not so promising. However that means that a good deal of the evaluators' efforts will go into trying to make sure comparison groups are equivalent a priori and adjusting for any remaining differences using a set of now quickly evolving

statistical procedures (e.g. propensity scoring and other matching strategies, instrumental variable approaches.)

Since communication effects will often spread from individuals directly exposed to messages to those in their social networks, evaluation designs should be able to go beyond individual difference comparisons between individuals who are personally more or less exposed to messages. They should attempt to make comparisons between social networks which differ in their direct and indirect exposure to messages.

In addition, it will be important for evaluations to assess the likely process of effects (thus including measures in surveys of exposure to messages, intended mediating variables (e.g., beliefs) as well as behavior). Also, evaluators should choose sampling strategies which permit comparison of effects among those likely to be differently affected by the intervention (better and less well educated; scheduled castes and others; men and women, etc.) This will also require that they incorporate measures which allow identification of subgroups of the population, so as to permit such comparisons.

12. Why India? Why not India?

There are several candidate countries for exploration of this class of communication for nutrition-agriculture interventions. Why is India (or part of India) an appropriate site or not an appropriate site? Five important rationales for selecting India as a site include (1) the presence of major nutritional deficits including a high level of child stunting and maternal and child anemia, (2) the sheer size of the population currently in nutritional deficit so that success in a program in India will affect the world deficit, (3) the presence of a variety of domestic and international institutions experienced in undertaking communication interventions in related areas, (4) some signs of a growing level of government commitment to addressing nutrition problems, and 5) the availability of nutritious foods within India's food system. On the other hand, a substantial concern is the limited reach of the mass communication system particularly to rural people, which would make it difficult to reach the poorest members of the population who have the greatest need. A second concern may be the obverse of an advantage – there are already many institutions doing related work particularly in the BMGF-focused states of Bihar and, to a lesser extent, UP and an additional program with related goals will need to define its niche. A third concern is the readiness and willingness of core government actors – particularly those from the agriculture sector – to meaningfully incorporate nutrition-related communication interventions into their work.

In our judgment, these concerns do not outweigh the advantages of working in India, but they will affect the design of the intervention. For example, it may be necessary to focus on groups who have some media access rather than uniquely on the poorest segment of the society. This may be acceptable since it is clear that

there is a good deal of stunting among children and a high prevalence of other nutritional deficits among children and among women in families that do not fall into the poorest category.^{xx} In addition, these people may be more likely to have both media access and some resources to implement behavioral changes requiring expenditures.

We are torn about an additional issue in choosing between Bihar and UP for the focus of the program. Bihar has the advantage of the Ananya project in full operation with BBC-Media Action as a central player. There would be a useful foundation on which a new project could build. On the other hand, because of all the prior work, it may be harder to detect effects of a novel effort and perhaps also hard to change the trajectory of ongoing work. A new project would likely be seen as a complement to ongoing work, adding a direct reach media component and focusing on nutrition/agriculture behaviors and that would be an important addition. The ICDS program in Bihar also appears to have advanced with requirements to provide fortified food products in at least some provinces (although not consistently). Uttar Pradesh would be fresher ground, with plans to build nutrition-related as well as health programs underway, but not yet realized. Alive and Thrive, with its important history in Bangladesh, is a central player in UP and could be a potential collaborator. It would likely be easier to build a new project and a new direction and to evaluate it more cleanly. Perhaps the choice between states may come down to opportunities to build longer term links with the Indian government and partner agencies and their likely openness to fully scaling up if project efforts were found to be successful.

We do not think it will be feasible to operate at a state level from the start. An early task of the implementer will be to choose a geographic focus and a population focus for the program. These foci choices will reflect knowledge about distribution of nutrition deficits and related behaviors and opportunities for change, local agriculture and livestock value chains, media access across alternative places and subpopulations, evaluation requirements and other issues.

The program will want to address two competing interests as it chooses a geographic area and a population. It will want them to be representative of the state (e.g. UP) where an eventual operation at scale would take place. On the other hand, it will want the chosen area and population to maximize the possibility for success, which may mean, for example, choosing a population which is more able to adopt a new behavior given its available resources or a geographic area with easier access for researchers.

End notes

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