Introducing a health, nutrition and sanitation program within microfinance groups: a systems-level mixed methods analysis from rural India

Laili Irani (✉ laili.ir@gmail.com)

Population Council <https://orcid.org/0000-0002-5472-507X>

Janine Schooley

Project Concern International

Supriya .

Population Council

Indrajit Chaudhuri

Project Concern International

Research article

Keywords: self-help groups, systems-level analysis, health layering, technical support unit, maternal health, newborn/neonatal health, child health, community based groups, marginalized populations, India

Posted Date: March 2nd, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-15649/v1>

License: This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background: Bihar has been lagging behind Indian national averages in maternal, neonatal and child health development indicators, primarily due to lack of knowledge on healthy lifesaving practices and where to seek services. Hence, a successful pilot project was scaled up as the JEEViKA Technical Support Program (JTSP), to support the state rural livelihood mission, JEEViKA, to increase demand for and link rural families to existing health, nutrition and sanitation (HNS) services. Program activities were geared in reaching those engaged in JEEViKA's microfinance-based self-help groups (SHGs). This paper presents the results of the output evaluation following 18 months of program implementation.

Methods: A mixed-methods study was conducted from August-November 2017. Sixty-five in-depth interviews were conducted with program, state, district and block-level officials. Quantitative surveys (678) were carried out among lower level staff, including village-based community mobilizers (CMs) who convene SHG meetings and support SHG-related activities.

Results: JEEViKA layered HNS onto its existing system. The block health, nutrition and sanitation integrator (BHNSI) was introduced within JEEViKA to support the layering of HNS work at the block level. CMs were being trained on HNS topics to be shared during SHG meetings. JEEViKA funded the trainings and paid additional remuneration to trained CMs. HNS indicators were routinely collected by CMs and data were analyzed and used across JEEViKA. JEEViKA was supporting new mechanisms for SHG families to procure food while linking them to existing health and nutrition schemes and services. CMs with HNS trainings were more likely to have higher levels of knowledge on HNS topics and were more likely to carry out HNS-related activities, such as interacting with BHNSI for guidance and support, collecting HNS data routinely and spending time weekly on HNS activities.

Conclusions: There is greater awareness within JEEViKA on the importance of addressing HNS issues to assist families in reducing economic shocks from health emergencies, improve nutrition and raise families out of poverty. Stronger integration of HNS programming within JEEViKA will be possible through the presence of decentralized staff to solely support these activities and a closer examination of the CMs' time to integrate HNS activities more coherently.

Introduction

In India, national surveys have shown a steady decline in maternal and infant mortality ratios over the past two decades (61% decline in maternal mortality ratio and 38% decline in infant mortality rate between 1990 and 2009) (1, 2). In addition, the national neonatal mortality rate (NMR) declined from 52 per 1000 live births in 1990 to 28 per 1000 live births in 2013 (3). However, disparities exist across states in the country, with northern populous states, such as Bihar, having the highest burdens of maternal, neonatal and child mortality (274 maternal deaths per 100,000 live births; 48 infant deaths per 1,000 live births; 70 under five child deaths per 1,000 live births) (4). The primary causes of these deaths in high prevalence states, like Bihar, are from preventable factors such as a lack of knowledge on best practices

and absence of information on where to seek services which result in not practicing healthy behaviors and a delay in accessing services during health emergencies (5, 6). Hence, programs have a unique opportunity to address such barriers in order to improve the uptake of healthy practices and hence reduced maternal, neonatal and child morbidity and mortality.

Background

In 2010-11, the government of Bihar (GOB) was undergoing accelerated modernization along with increased support from the national government and a high-level political commitment at the state level. A prime area for increased effort and focus was improving the health of the population, particularly maternal, neonatal and child health (MNCH). As a result, various development partners were encouraged to invest resources into the health system. Among them was the Bill and Melinda Gates Foundation (BMGF) which established a five-year partnership with the GOB to co-develop and implement a package of essential and locally-relevant health and nutrition interventions that would address service delivery as well as create a demand for services at the community-level. The government-run microfinance-based self-help groups (SHGs) – formed by women of marginalized communities in rural areas – and their federated structures were identified as a viable, sustainable and effective strategy for promoting healthy behaviors through community mobilization. The groups were anticipated to grow in numbers, and trials in India and Nepal had shown strong evidence of positive impact of women's groups on MNCH indicators (7-10). Hence, a global development organization, Project Concern International (PCI), tested the efficacy of layering health interventions onto SHG platforms – in 64 blocks across 8 districts of Bihar – by forming its own SHGs. In this pilot project called Parivartan (meaning 'change' in Hindi) 11 health modules were developed and shared on specific topics related to antenatal care, birth preparedness, postpartum and newborn care, exclusive breastfeeding, and complementary feeding, as well as sanitation behaviors. Each week, one of the modules was shared in the SHG meetings, through the help of a village volunteer. Comprised of the most marginalized women, these groups had the potential to discuss correct health practices, address social barriers to behavior change and improve the uptake of healthy behaviors at the individual level as well as health-seeking behaviors through mutual support the group members provided to each other. By mid-2014, a quasi-experimental impact evaluation had shown exponential improvements in key neonatal (practice of skin-to-skin care, delayed bathing for 3/more days, initiate timely breastfeeding), child (exclusive breastfeeding, age-appropriate immunization) and maternal health outcomes (contraceptive use, institutional delivery) (11, 12).

Around the same time and with the support of the World Bank, JEEViKA formed 350,000 SHGs across the state with the goal of improving livelihoods and economic security. Furthermore, JEEViKA acknowledged the need to address MNCH morbidities as a means to reduce economic shocks and improve livelihoods. The success of the Parivartan project, as a proof of concept, paved the way for a collaboration between GOB, BMGF and PCI in scaling-up and leveraging community platforms of JEEViKA to move the state's health agenda forward. Hence, JEEViKA Technical Support Program (JTSP) was created in 2015. It had two key mandates – first, to scale-up the layering of health, nutrition and sanitation (HNS) messaging carried out in the pilot phase to 101 blocks across 11 districts, and second, to provide techno-managerial

support across all the blocks in order to bring about system-level changes that could be implemented statewide. This would enable JEEViKA to institutionalize the focus on HNS interventions. Subsequently, the evaluation of JTSP was commissioned by BMGF and the GOB to measure the impact of the layered, multi-level scaled-up program at the population-level and system-level. This paper presents the results of the systems-level organizational assessment within a year and half into the implementation of the program. The objective of this assessment is to measure how JTSP has supported JEEViKA in layering HNS programming onto its routine operational, administrative and programmatic focus.

There are few documented examples that describe the impact of technical support units established within government departments in order to build institutional capacity and support their unique functions. For example, Sgaier et al describe the role of establishing a technical support unit in the Indian state of Karnataka to support the National AIDS Control Program to enhance its managerial and technical capacities (13). The support provided through both the private and non-governmental sectors paved the way for the government to improve and scale up programs and to absorb previously donor-funded programs. Other investments and efforts have been evaluated looking at the implementation of development programs across multiple sectors, such as for nutrition and early childhood development (14, 15). These articles describe the challenges of integrating multisectoral programs and highlight the need for high-level political buy-in coupled with the need for adequate capacity and funding. Our paper goes further to describe the layering of an HNS-focused intervention within a non-health state department documenting the institutional changes needed to layer new programming onto a different technical domain. It also documents the additional processes that occur at every level of the institutional hierarchy thus highlighting the need for concerted efforts at every level and across all verticals within the institution.

Context

Structure of JEEViKA

In order to understand the techno-managerial support that JTSP is providing across JEEViKA, we first briefly describe the organizational structure of JEEViKA (16) and the key roles and responsibilities of the various cadre (17). JEEViKA has a CEO who is responsible for the overall strategy and functioning of the program. State project managers head the state team and report to the CEO; they manage discreet domains, such as governance and knowledge management, institution- and capacity building, microfinance institutions, social development, livelihoods, monitoring and evaluation (M&E), and health and nutrition. Each state project manager is supported by two-three project managers who are jointly responsible for strategy development, program management, coordinating with other verticals and programs within and outside of JEEViKA, capacity building, monitoring, etc. Each of the state's 38 districts is headed by a district project manager who is responsible for JEEViKA's planning and implementation of all district activities. A health and nutrition (HN) manager at the district level reports to the district project manager, and oversees the implementation of health and nutrition programming across the district, such as monitoring all health and nutrition initiatives and encouraging staff to

implement health and nutrition programming into their work, wherever relevant and possible. In turn, each block within the district is led by a block project manager (BPM) who is responsible for managing the program at the block level related to implementing activities, financial management, human resource management, and monitoring and evaluation. Bihar state has 534 administrative blocks. Each block is further generally divided into three areas, designated by JEEViKA, and led by an area coordinator who reports to the BPM. Further, each area is divided into three clusters led by a cluster coordinator who oversees the work at the cluster level and reports to the BPM. These are all paid JEEViKA staff.

A community mobilizer (CMs), is the grassroots functionary of JEEViKA and is responsible for managing 10-12 SHGs in a village (18). She is the convener of weekly SHG meetings, manages the financial books of each of the SHGs, links the groups to local banks and is the liaison of the SHGs to JEEViKA. CMs are often appointed from among the SHG women who are motivated to facilitate SHGs; once appointed, CMs may mobilize other women to join SHGs till each CM has 10-12 groups under her purview. CMs report to their cluster coordinator and receive a monthly stipend which increases over time and with additional responsibilities. Each village may have one or more CMs depending on the size of the village and number of groups. Further, all the SHGs within an administrative gram panchayat will form a village organization (VO) where the office bearers (chairman, secretary and treasurer) of each SHG become the members of the VO. Several services are routed through VOs and routine monitoring data on the functioning of SHGs is compiled at the VO level before being sent to the block office of JEEViKA on a monthly basis.

Implementation framework of JTSP

Keeping the existing structure of JEEViKA in mind, JTSP designed the system-level support to layer HNS programming (Figure 1). Several inputs were designed to support layering activities across the hierarchy of JEEViKA at the systems-level, such as 1) revising job descriptions and responsibilities to support HNS activities, 2) introducing the block health, nutrition and sanitation integrator (BHNSI) to further support layering of HNS activities at the block level, 3) linking JEEViKA to existing health and nutrition services available in the community while channeling specific schemes and services through the JEEViKA cluster and village entities, 4) having state funds allocated to support the layering efforts, 5) conducting trainings of CMs on HNS messages so they could share health information through SHG meetings, and 6) adding community HNS indicators into existing monitoring systems to ensure routine data collection, analysis and usage of data. JTSP localized and customized the package of HNS messages to be shared with women in the communities; this expertise was built from the experience of implementing the Parivartan program using a behavior change communication approach (11). As a result, 16 modules on HNS messages were developed to share knowledge on various healthy maternal, neonatal and child HNS practices. Master trainers were provided by JTSP to further train the JEEViKA cadre, including the CMs on key messages proven to reduce preventable maternal, neonatal and child mortality. In addition, JTSP developed the concept of the BHNSI, a cadre supporting the layering of HNS work at the block level. These BHNSI were further recruited, trained and inducted by the program. These systems-level approaches were being implemented in the 101 blocks where JTSP was providing on-the-ground support.

Specific attention was paid to the effect of the intervention on the CMs as they were the grassroots functionaries who were expected to learn about HNS and then dispense this knowledge to SHG members and their families. This effect was measured through change in knowledge of CMs on HNS issues they learned about, whether they interacted with BHNSI to receive the support they needed, regularly captured HNS-related indicators in the SHG registers they maintained and whether they'd spent any time in the past week incorporating these additional activities within their work schedule. These indicators together gave a wholistic picture of the change in the role of the CMs following their trainings of HNS modules and the guidance they were given in the trainings on the additional activities they were expected to perform in layering HNS activities onto their routine responsibilities.

The objective of this paper is to share the results of the output evaluation examining the effect of the techno-managerial support JTSP has provided in supporting JEEViKA to layer HNS programming across its entire administrative system. Furthermore, we measure the effect of the program on the grassroots functionaries, CMs, by studying the association of the HNS trainings on their knowledge of the topics learned and their work performance as measured through various activities they undertake. The theoretical context is that sharing information with SHG women on best MNCH practices and where to seek preventive and curative services will increase the uptake of healthy MNCH practices and demand for healthcare services. This uptake is facilitated by JEEViKA and the CMs, in particular, to increase women's knowledge, support their individual volition, and encourage support from families and SHG women. Hence, JEEViKA and CMs, in particular, play a critical role in ensuring the success of the program.

Methods

Research design

In order to measure the effect of JTSP within a year and half of its implementation, an assessment was carried out between August-November 2017. Using a cross-sectional study design, we sampled ten blocks, each from a different district of Bihar; seven came from blocks where JTSP was implementing its program and the remaining three from non-JTSP intervention blocks. Ethical clearance was sought from the independent evaluators' institutional review board.

Study sample

A mixed-methods approach was employed with qualitative interviews conducted among the senior staff of JEEViKA and a quantitative structured interview carried out among the community cadre. Qualitative data collection included in-depth interviews which were carried out among the following staff: six key JTSP program staff from the implementing organization, six state project managers and a corresponding project manager, each of the ten district project managers and their corresponding HN managers (nine were available), each of the 10 BPMs (eight were available) and the corresponding BHNSI; five BHNSI were available for an interview. In total, 45 in-depth interviews were conducted.

All BPMs were asked to share a list of area and cluster coordinators and CMs in their blocks. From this list, 19 area coordinators across the ten blocks participated in a quantitative survey (14 among JTSP blocks and 5 among non-JTSP blocks). In addition, 65 cluster coordinators were surveyed (47 among JTSP blocks and 18 among non-JTSP blocks). Furthermore, 594 community mobilizers (418 among JTSP blocks and 176 among non-JTSP blocks) were interviewed across the 10 blocks. Hence, in total 678 quantitative interviews were conducted.

Data collection

Prior to conducting the surveys, several management and capacity building frameworks were reviewed in order to develop the themes for the interviews (19, 20). The intention was to appropriately capture the capacity building efforts of JTSP through a self-assessment of the efforts JEEViKA had made to layer HNS programming. In consultation with PCI, the management and organizational sustainability tool (MOST) was modified and used as it served to reflect on the key elements of institutional change through introspection and self-perspective of the organization's employees and those who were experiencing the change (21). In addition, it enabled us to analyze the experiences of staff at various levels and provided us the opportunity to collate concrete suggestions from existing staff. The MOST framework aided us to design the tools in order to capture the strategic, structural and system-level changes that had occurred, the engagement of the various cadre in designing and implementing the organizational changes, the immediate effect of these changes on their routine functions and performance, and suggestions for improved layering of HNS programming within JEEViKA.

The qualitative interviews were audio recorded with detailed notes taken at the time of the interview. Interviews were conducted in Hindi, the native language of Bihar. Trained investigators conducted the interviews often in the presence of the research team. Interviews with state-level officials of JEEViKA and program staff were conducted by the PI of the study (first author) and research team. Interviews were then transcribed and translated. Key themes were identified and coded using Atlas.ti 6 following the systems-level approach to document the process of layering and the impact of such efforts to date (22).

Quantitative interviews were conducted using structured tools, carried out by trained investigators in Hindi using a mobile-based data entry application, CSPro 6.3 (23). Enumerators travelled to sub-blocks and villages to interview sampled community cadre workers. A group of quality assurance monitors were attached to each data collection team. About one-third of these interviews were spot checked to ensure quality control. The data were then analyzed using Stata 13 (24). Data triangulation was done by incorporating the findings from qualitative interviews, and key findings from quantitative data collected from area and cluster coordinators, and CMs.

Analysis plan

Data from interviews with state, district and block officials, and area and cluster coordinators were used to describe the system-level changes. Results were presented as key output level changes at the system-level across five key domains: the expanded roles and responsibilities of JEEViKA staff, effect of the

induction of BHNSI, experience of linking SHG women to health and nutrition-related schemes and services, JEEViKA and JTSP's efforts to support the HNS layering within SHGs, and monitoring HNS programming through the addition of relevant indicators into the existing management information system (MIS).

The 594 interviews with the CMs were further analyzed quantitatively using four key dependent variables of interest: the level of knowledge on HNS topics, interaction with BHNSI, maintaining data on HNS indicators and carrying out HNS activities in the past week. In order to measure the first dependent variable, CMs were asked 34 questions related to knowledge and awareness of correct practices on HNS. For questions with binary responses, those who responded to the questions correctly received a single score. For questions with multiple responses, each respondent received a fractional score depending on the number of correct responses they gave. For example, if a question had four correct responses, each correct response elicited 0.25 score, to a maximum of one for that question. Further, all the 34 knowledge-related questions were summed up to form a continuous variable and used as an outcome indicator. In order to capture the second dependent variable, CMs were asked if they had interacted with a BHNSI in the past year, captured as a dichotomous variable. To measure the third dependent variable, CMs were asked if they had captured HNS indicators in their routine monitoring registers over the past month. In order to capture the fourth dependent variable, we asked the CMs to list all the SHG-related activities carried out by her in the last seven days. If a CM noted that she had filled in the health and nutrition register or conducted a SHG meeting where HNS messages were shared, she was denoted as having spent time in carrying out HNS-related activities.

The key independent variable of interest was whether the CM reported receiving a training on an HNS topic in the past year or not. CMs were asked to report if they received any training on maternal and child health, nutrition, or sanitation practices in past year through any of the 16 modules prepared. All CMs from JTSP blocks who received at least one training were considered as having 'received training on HNS topics'.

Other covariates were also captured and assessed in determining the association of training on CMs' layering of HNS activities. These indicators included: the age of the respondent, in years, categorized into three groups (18-24, 25-34, 35/older), gender (male, female), religion (Hindu, others), caste (scheduled castes/scheduled tribes (SC/ST), other backward castes (OBC), others), education (0-8 years of schooling, 9-10 years, 11-12 years, 13/more), marital status (currently married, others), mobile phone ownership (personal, shared with the family), type of mobile phone (brick, feature, smartphone), average duration of association with JEEViKA in months and average number of hours the CM worked in a day. Basic sociodemographic indicators were controlled for in the analysis as indicators such as education and age have been known to be associated with levels of knowledge and performance related to capacity building efforts (19, 25). Furthermore, length of association with an organization and the number of hours worked were also known to be associated with performance (26-28).

Bivariate analyses of covariates was conducted by those who received HNS training and those who didn't. We further expounded on indicators related to the knowledge score and time use patterns of CMs. For example, we present bivariate results of knowledge scores for each of the individual questions by those who received training and those who didn't. We further delve into the time spent by the CMs on key tasks and activities over the course of the week, comparing the results with those who received HNS training and those who didn't. In addition, we also present a time log of the activities the CMs conducted in the 24 hours preceding the interview in order to get a sense of how CMs carry out their SHG functions and other activities over the course of their day. Furthermore, bivariate and multivariate analyses of all independent variables were conducted across each of the four dependent variables of interest in order to determine the effect of HNS trainings on the variables of interest. Proportion tests were conducted to compare the significance of the bivariate results. For multivariate analyses, a linear regression was run to measure the effect of training on knowledge scores, controlling for other covariates. Logistic regression was run to measure the effect of training on the other three practice-related dependent variables, namely, interaction with BHNSI, filling in HNS data in registers and spending any time on HNS activities.

Results

System-level changes

The output-level results capture the voices of the implementing program and state officials from the highest levels down to the staff supporting the grassroots functionaries. These results are presented across five key domains outlined above, namely, a change in roles and responsibilities due to the layering of HNS activities, the role of BHNSI in supporting HNS layering, linking SHGs to existing health and nutrition schemes and services in villages, JEEViKA and JTSP's specific role in supporting the layering efforts, and the current process of monitoring HNS layering as captured through JEEViKA's internal MIS.

Roles and responsibilities of JEEViKA staff

Through the layering on HNS across JEEViKA, all staff took on additional responsibilities. State project managers and their associated project managers coordinated their activities and discussed how HNS activities could be layered onto their respective priorities. For example, the vertical on health and nutrition planned and rolled-out HNS trainings across 101 blocks in coordination with other verticals, such as institution- and capacity building. During the interviews, several staff members, especially the project managers and HN managers mentioned receiving guidelines detailing their revised roles and responsibilities. They also received additional key performance indicators detailing HNS activities to be layered onto their existing roles and responsibilities.

At the district-level, district project managers mentioned providing technical oversight and strategic guidance in the implementation of the HNS program. They assessed the progress of the program's implementation in consultation with the HN manager and reviewed monthly block reports on HNS

indicators to monitor the progress. Further, they served as a bridge between the blocks in their jurisdiction and the state project managers. On the other hand, the district HN managers who reported to them oversaw the trainings of the HNS modules in their district, generated awareness of HNS within JEEViKA during their meetings and field visits, coordinated closely with JTSP in program implementation, collated block reports into a district report and served as a liaison for the BHNSI, block project managers and district officials. An HN manager shared the impact of his work in the following words,

"I give HNS a lot of importance, as I believe it has long term impact. One of the important impacts of HNS is on the livelihoods of people."

Block project managers seemed well versed with their new functions and responsibilities. They reported monitoring HNS trainings in their block, supervising the BHNSI and coordinating trainings with master trainers. They also accompanied BHNSI to the villages often to conduct unannounced field visits and interacted with CMs and SHG members to understand the ground reality of layering HNS.

Within the blocks, area coordinators had on average been in their current position for under 4 years and cluster coordinators for under 2.5. Area coordinators were primarily responsible for preparing area plans (90%) and executing them along with facilitating bank linkages for SHG members (79%). In addition, they were promoting HNS activities (58%) within their respective areas along with supportive supervision and monitoring of those activities (68%). Analysis of their time suggested that they carried out these additional responsibilities within their average eight working hours a day. On the other hand, cluster coordinators were primarily responsible for forming and strengthening VOs (83%) and training the members (83%). In addition, they organized community level health and nutrition activities (camps). A cluster coordinator covered, on average, around 11 villages, with about 89 CMs directly reporting to him/her. They were the first line of response to a CM's request for guidance or assistance. They also collated HNS indicators at the village level and carried it forward to the block office. Analysis of the time they had spent working over the week preceding the survey suggested that they worked for ~7.5 hours/day over 6 working days and had managed to implement HNS activities during that time. Respondents said that they were motivated to include HNS activities due to encouragement and support from their supervisors, and had gained confidence to discuss HNS matters in the community. They were also satisfied with their work environment, primarily for receiving adequate opportunities to contribute ideas to improve services within JEEViKA, getting opportunities for training, and having supplies and equipment available for work, such as training materials.

Induction of BHNSI

BHNSI were staff at the block level who were appointed to support activities for HNS layering across the block. They were trained by JTSP prior to taking on their role in supporting JEEViKA's implementation strategies. This staff's salary was being paid by JTSP but they reported to the BPM as a JEEViKA block staff member. They organized trainings on HNS modules across the block, provided post-training support to the CMs, monitored the implementation of the modules and coordinated with various JEEViKA

departments. In several interviews, block and district officials noted that BHNSIs were great support. Two BPMs stated,

“The BHNSI plays an essential role in sustaining the HNS activities in the block,” and,

“Due to the presence of BHNSI in the system, HNS activities are taken more seriously by JEEViKA staff.”

Hence, the presence of BHNSI was of great help in supporting HNS activities at the block level.

Linking SHGs to health and nutrition schemes and services

Our interviews revealed that within JEEViKA, efforts to layer HNS programming were focused on two key components – one, generating demand for health services through increased interactions with frontline health workers and seeking health services in public facilities, and two, increasing knowledge of the practice of healthy maternal, neonatal and child behaviors among SHG women. In line with the first objective, JEEViKA was making several efforts to link SHGs to health and nutrition schemes and services. To this effect, project and HN managers along with BHNSI said that they were interacting with external agencies such as the Integrated Child Development Scheme and community health system, to leverage support for HNS layering. In addition, block project managers stated that they interacted with block development officials and representatives of the primary healthcare system, to seek their support for HNS programming. In order to achieve the second objective, CMs were trained on key maternal, neonatal and child behaviors that they were encouraged to share in SHG meetings at least once a month and through home visits of SHG members' households especially where there was a pregnant woman or a child under two present. They were also encouraged to advise SHG women to accompany pregnant and lactating mothers to health services, visit Angadwadi centers (where nutritional foods were distributed), attended village health sanitation and nutrition days (VHSNDs) which were held monthly for immunizations and nutritional camps, and, invited frontline workers to SHG and VO meetings. CMs described these tasks as part of their routine activities and reported on them to their supervisors.

Supporting HNS layering at SHG level

With JEEViKA's encouragement and support, JTSP identified interventions that are effective and acceptable to the community. They then developed the interventions and its individual components using human centered design and concurrent measurement, and ensured quality by providing handholding support, mentoring, supervision and review. These interventions include the development and introduction of training modules on HNS ranging from an orientation module highlighting the importance of HNS, to early initiation of breastfeeding, complications during pregnancy, antenatal care, birth preparedness, iodine deficiency, basic newborn care, complications in mothers and newborns, family planning, and maternal and child nutrition, among others. Trainings are conducted by master trainers for all staff of JEEViKA and the implementation is supported by quality assessment and support teams who regularly support JEEViKA in monitoring the progress of the implementation of the modules; both master trainers

and the quality assessment and support teams are paid staff of JTSP but seconded to JEEViKA. More than 40% of all JEEViKA cadre interviewed mentioned being trained at least on the first module which is an overarching introduction to the key healthy maternal and child health behaviors and the significance of practicing those behaviors at the population level. HN managers who attended the trainings and workshops stated that it helped them build self-confidence and further encouraged them to establish community links for generating HNS awareness. They further highlighted that they interact with JTSP staff, i.e. the regional manager and quality assurance support coordinator, every month to plan and monitor the trainings. BPMs reiterated that they regularly conducted field visits with master trainers and BHNSIs to speak with CMs and discuss implementation on the ground. In addition, JTSP assisted JEEViKA in incorporating the key objectives of HNS within the community operational manuals; hence, new groups being formed have the layering of HNS programming as an integral part of their functioning.

At the decentralized level, JEEViKA, on the other hand, also contributed significantly to the layering of HNS programming on the ground. They mandated the layering of HNS programming across the entire organization with great emphasis put on building the capacity of CMs and supporting them in every way possible. Select VO members were invited to form a health sub-committee which assists JEEViKA in the village in carrying out its health-related activities. Following the formation of the sub-committees, the members were oriented on their roles and responsibilities by BHNSIs. A government order issued in this regard directed the sub-committee to act as an interface between frontline workers and the community thus mobilizing the community to access health services. Sub-committee members carried out home visits to pregnant women and mothers of young children; encouraged women to attend Annprashan days (when information and food was distributed at Angadwadi centers), VHSNDs; held special seminars and rallies in the village when called on to do so, etc. JTSP officials informed us that by August 2016, 73% of the VOs (across the 101 blocks) reported participation of FLWs in their monthly meetings. In addition, the state's commitment was highlighted in their financial support rendered to the layering of HNS programming. For example, JEEViKA supported the logistical arrangements and bore the financial costs of HNS trainings, costs for printing modules and other materials, travel and daily allowances for BHNSI when visiting the field along with monthly stipends (INR 300/USD 4.5) to the CMs who have received the training and were carrying out additional tasks. One BPM noted the secondary effect of this support, saying

"JEEViKA funding for HNS training serves as a monitoring mechanism of HNS activity progress in my block."

A few instances of delayed payments to the community cadre workers were reported by block officials; as it affected motivation to work, these delayed payments were being addressed and efforts were being made to prevent such activities from happening in the future. JEEViKA also established several funds at the VO level to support HNS layering; these included a health risk fund primarily used for community development and toilet construction, and food security fund used to procure food for SHG households.

Layering HNS indicators into the MIS

Indicators to capture the implementation of HNS activities were added to JEEViKA's existing MIS system. Hence, at all levels across the institution, JEEViKA staff collect, collate, analyze and review a set of additional indicators in relation to their existing monitoring tasks. Examples of indicators are, numbers of: SHG meetings where HNS messages were shared, VO meetings where frontline workers were present, VOs that received food security funds and VOs that purchased rice, wheat and other food items from it, VOs that received health risk funds, VHSNDs in which health sub-committee members participated, Annprashan days at which VO/SHG members participated, numbers of households where kitchen gardens were started, and households visited by health sub-committee members to check on a pregnant woman/child under the age of 2.

CMs compile data in HNS-designated forms and registers on a monthly basis. Cluster coordinators, with the assistance of bookkeepers, collate the data at the VO level which is then further compiled by area coordinators and shared with BHNSI monthly. BHNSIs prepare monthly reports shared with district officials and JTSP. From the district, updates are shared with the HNS vertical at the state office. In state quarterly review meetings, the CEO is present where HNS indicators along with different livelihood and capacity-building parameters are also assessed. Data at the block, district and state-level are reviewed against planned targets to monitor progress, identify areas for further improvement and target efforts accordingly.

Layering onto CMs

A key indicator for layering HNS programming on the CMs was having received at least one training on HNS topics. During those trainings, CMs learned about key messages they were expected to share and were also informed of the additional tasks they would undertake to layer HNS programming into their daily SHG activities. Staff trained highlighted that the classroom instructions were enhanced through sharing of real life examples, such as case studies, supplementary materials, etc. District level officials highlighted the need for continued training to prevent a dilution of knowledge from the mater trainers to the CMs to the SHG members over time.

We present various analyses highlighting the differences in the CMs of those who were trained and those who were not, such as their background characteristics and levels of knowledge on HNS-related messages they learned in the trainings. We then further analyzed the work-related tasks they carried out during the week and how they spent their day in an attempt to understand how they layered HNS activities onto their existing responsibilities. In addition, we identified key determining factors that were associated with CMs' increased knowledge of HNS topics, interacting with BHNSI, capturing HNS indicators, and time spent on any HNS activity in the past week.

Of the 594 CMs' interviews conducted, 418 were from JTSP blocks and the remaining 176 were from non-JTSP blocks. Of those from the JTSP blocks, 89% (372) CMs had received at least one HNS training till the time of data collection. The most common topics included the introductory module on the importance of HNS (70.3%), antenatal care (54%), basic newborn care (53.2%), immunization (25%), child nutrition (21.8%) and sanitation practices (15.9%). Of those trained, almost two-thirds (61%) had received training

on four/more topics. Table 1 presents key background characteristics of the CMs, by those who received training and those who didn't. Majority of the CMs are 25-34 years old (39.9%), women (99%), belonged to the Hindu religion (95.8%) and were from other backward castes (68.9%). Furthermore, majority had completed high school/more (88.9%), were married (81%) and owned a mobile phone (89.9%) which was a basic brick phone. On average, CMs had been carrying out their duties for the past 2.5 years and worked an average of four hours/day five days a week. Test of proportions suggested that CMs trained on HNS topics from the JTSP blocks were older, more likely to own a mobile phone and had been associated with JEEViKA a year and 3 months longer than the CMs who had not received the training. Hence, these characteristics were adjusted for while conducting multivariate analyses to understand the individual effects of training of CMs' knowledge on HNS topics and related activities.

Table 1

Background characteristics of community mobilizers (CMs), by receipt of training/not

Background Characteristics		Percentage (%)		
		Total (N = 594)	Did not receive HNS training (N = 222)	HNS training (N = 372)
Study Arm	JTSP blocks	70.4	20.7	100.0*
	Non-JTSP blocks	29.6	79.3	0.0*
Age	18–24 years	33.3	44.6	26.6*
	25–34 years	39.9	35.6	42.5
	35 years and above	26.8	19.8	30.9*
	Mean (SD)	29.2 (7.9)	27.1 (7.1)	30.4 (8.1)
Gender	Male	0.8	1.8	0.3*
	Female	99.2	98.2	99.7*
Religion	Hindu	95.8	96.4	95.5
	Others	4.2	3.6	4.6
Caste	SC/ ST	20.2	18.0	21.5
	OBC	68.9	68.9	68.8
	Others	10.9	13.1	9.7
Education	0–8 years	11.1	6.8	13.7*
	9–10 years	33.7	34.7	33.1
	11–12 years	32.2	32.9	31.7
	13 + years	23.1	25.7	21.5
Marital status	Others	19.0	20.3	18.3
	Currently married	81.0	79.7	81.7
Own a mobile phone	Personal	89.9	84.7	93.0*
	Shared	10.1	15.3	7.0*

* = p-value < 0.05

Background Characteristics		Percentage (%)		
		Total (N = 594)	Did not receive HNS training (N = 222)	HNS training (N = 372)
Type of mobile phone	Basic brick phone	75.8	77.5	74.7
	Featured phone	16.2	14.4	17.2
	Smart phone	6.4	4.5	7.5
Duration of association	Duration of association with JEEViKA in months (mean, SD)	31 (21)	22 (16.2)	37* (21.8)
Work duration	Weekly working hours (mean, SD)	18.4 (13.8)	17.2(13.3)	19.2 (14.1)
* = p-value < 0.05				

Table 2 compares the knowledge of CMs on HNS messages by those who received training and those who did not. Results suggest that those who received training had more knowledge across all the domains than those who did not receive training. These included topics related to healthy maternal practice during pregnancy (registration of pregnancy, antenatal care check-ups, delivery preparedness), institutional delivery, timely post-natal checkups, neonatal care (skin to skin care, clean cord care, delayed bathing), emergency contact numbers for ambulance services, diarrhea care management, maternal and child nutrition, and services available at Anganwadi Centres, VHSND and Annaprashan days.

Table 2
Knowledge scores of community mobilizers (CMs), by receipt of training/not

A. Knowledge Indicators (Average scores)	Average knowledge score of CMs (For each indicator, knowledge score can vary from 0 to 1)		
	Total (N = 594)	Did not receive HNS training (N = 222)	Received HNS training (N = 372)
1. Skin to skin care	0.7	0.5	0.8*
2. Delivery preparations for birth (home/hospital)	0.6	0.3	0.7*
3. Tests during ANC check-ups	0.5	0.4	0.7*
4. Registration of pregnancy	0.5	0.3	0.6*
5. Proper nutrition during pregnancy	0.5	0.4	0.6*
6. Benefits of institutional delivery	0.4	0.3	0.5*
7. A pregnant/ lactating woman eating in comparison to a non-pregnant woman to provide good nutrition to her baby and help baby grow	0.4	0.2	0.5*
8. Services provided at the Anganwadi Centre	0.3	0.2	0.4*
9. Clean cord care	0.3	0.1	0.4*
10. Post-natal check-ups of the new born	0.3	0.2	0.4*
11. Making child's food nutritious and energy dense	0.3	0.2	0.4*
12. Services provided under VHNSD	0.3	0.1	0.4*
13. Immediate new born care	0.2	0.1	0.3*
14. Health complications faced by new born within the first month of birth	0.2	0.1	0.2*
C. Knowledge Indicators (Proportions)	Proportion of CMs who answered correctly to binary knowledge indicators		
* = p-value < 0.05			

A. Knowledge Indicators (Average scores)	Average knowledge score of CMs (For each indicator, knowledge score can vary from 0 to 1)		
	Total (N = 594)	Did not receive HNS training (N = 222)	Received HNS training (N = 372)
	Total (N = 594)	Did not receive HNS training (N = 222)	Received HNS training (N = 372)
1. Incentives of INR 1400 under Janani Evam Bal Suraksha Yojana (JBSY) on delivering at government health facility	97.8	96.4	98.7
2. Timely initiation of breastfeeding	95.1	90.5	97.9*
3. Check-up of the new born baby within 1 hour of birth	94.6	92.4	96.0
4. Initiation of semi solid food at six months	93.9	91.9	95.2
5. Knows whom to call for assistance during pregnancy related emergency	93.4	86.0	97.9*
6. Institutional delivery	90.4	85.1	93.6*
7. Two or more TT injections during pregnancy	84.0	72.5	90.9*
8. Infant under six months of age should not be given water	82.5	68.5	90.9*
9. Pregnancy registration in the first trimester	80.6	68.5	87.9*
10. Annaprashan Divas is held on 19th of every month	78.1	62.2	87.6*
11. Emergency number for the ambulance service	76.4	50.9	91.7*
12. Inclusion of tricolored food items during pregnant woman	76.3	46.9	93.8*
13. A 6–24 months old children should be given semi-solid food only	74.8	77.0	73.4*
14. Delayed bathing for 72 hrs	73.9	55.9	84.7*
15. 100 or more tablets during pregnancy	72.1	46.9	87.1*
16. Availability of 24-hour ambulance during emergency	70.5	59.5	77.2*

* = p-value < 0.05

A. Knowledge Indicators (Average scores)	Average knowledge score of CMs (For each indicator, knowledge score can vary from 0 to 1)		
	Total (N = 594)	Did not receive HNS training (N = 222)	Received HNS training (N = 372)
17. Minimum birth weight	68.7	65.8	70.4
18. ORS treatment during diarrhea	66.2	52.7	74.2*
19. Initiation of water, animal/formula milk, semi-solid or solid food like khichri after six months of birth	65.2	43.2	78.2*
20. At least three antenatal check-ups	28.6	9.5	40.1*
* = p-value < 0.05			

A detailed weekly time use analysis of the CMs showed that the most common tasks that CMs reported working on and spending the most time on included: conducting SHG meetings and sharing HNS messages when possible, maintaining books of records where they documented savings and other progress indicators such as HNS indicators, prepared micro-plans for the groups, and facilitated bank linkages for the members (Table 3). A comparison of the time spent on the various activities over the course of the week by the CMs trained in HNS versus those not trained further highlighted that those who trained spent more time doing HNS-related activities, such as capturing HNS indicators, and sharing HNS messages in SHG meetings and through home visits. Hence, this suggested that when CMs layered HNS activities onto their existing responsibilities, they replaced the time they were spending on non-HNS activities by HNS activities thus contributing the same time to their SHG responsibilities. This was highlighted further in the 24-hour time use analysis of their previous day where CMs were most likely to carry out their SHG-related activities in the morning and early afternoon (Fig. 2). This pattern did not differ for those who were trained on HNS topics versus those who were not and there were no other significant differences across geographies or characteristics of the CMs. The rest of the time, the CMs were pre-occupied with household responsibilities and a small proportion of them were also engaged in other income generating activities, such as non-farm economic activities, raising animals, etc.

Table 3

Key tasks and activities performed by community mobilizers (CMs) in past 7 days and average time spent on these activities

Key tasks and activities	% of CM who report carrying out specific activity in past 7 days (N = 594)	Average time spent on these tasks and activities in seven days		
		Total (N = 594)	Did not receive HNS training (N = 222)	Received HNS training (N = 372)
Meeting facilitation and conducting a meeting for non-health topics	40.1	11.9	13.5	11.1*
Maintaining books of record	43.3*	2.1	2.6	1.9
Maintaining health and nutrition register	23.7*	1.5	1.4	1.5
Training to SHG members	23.7*	2.3	2.0	2.3
Preparing micro plan for SHG	19.9*	2.1	2.0	2.1
Facilitation of bank linkages	12.8*	0.9	1.2	0.8
SHG formation	12.0	3.0	4.6	2.1
Facilitation of opening bank accounts	11.6	0.5	0.6	0.4
Conducting meetings where health, nutrition and sanitation modules are rolled out	6.1*	1.3	0.9	1.4*
Attend village organization, cluster and administrative meetings	6.7	0.5	0.8	0.5
Conflict resolution at SHG level	2.9	0.3	0.3	0.3
Average working hours: 18 hours/week				
* = p-value < 0.05				

Table 4

Bivariate analysis showing association of background characteristics by outcome indicators

Background Characteristics		Knowledge and Awareness score	Interacting with BHNSI		Maintain HNS registers		Spent time on HNS activity in past week	
		Average score	No	Yes	No	Yes	No	Yes
		21.0 (N = 594)	45.6 (N = 271)	54.4 (N = 323)	40.1 (N = 238)	59.9 (N = 356)	73.1 (N = 434)	26.9 (N = 160)
Received training on HNS	Yes	23.7	24.7	94.4*	18.1	92.4*	54.4	85.0*
	No	16.5 7	72.3	5.6*	81.9	7.6**	45.6	15.0*
Study arm	CMs in JTSP blocks	22.9	35.8	99.4*	30.3	97.2*	63.4	89.4*
	CMs in non JTSP blocks	16.5	64.2	0.6*	69.8	2.8*	36.6	10.6*
Age	18–24 years	19.2	42.4	25.7*	41.2	28.1*	34.8	29.4
	25–34 years	21.6	35.1	44.0*	37.0	41.9	38.5	43.8
	35 + years	22.4	22.5	30.3*	21.9	30.1*	26.7	26.9
	Mean (SD)	-	27.7 (7.5)	30.3 (7.9)	27.8 (7.4)	30.1 (8.0)	29.1 (8.1)	29.4 (7.3)
Gender	Male	18.5	1.5	0.3	1.7	0.3	1.2	0.0
	Female	21.0	98.5	99.7	98.3	99.7	98.9	100
Caste	Scheduled castes/Scheduled tribes	21.6	19.9	20.4	19.3	20.8	20.1	20.6
	Other backward castes	21.1	66.1	71.2	68.9	68.8	69.4	67.5
	General	19.6	14.0	8.4*	11.8	10.4	10.6	11.9
Education	0–8 years of schooling	22.3	9.6	12.4	8.4	12.9	10.1	13.8
	Completed 9th /10th grade (high school)	20.9	32.8	34.4	38.7	30.3*	34.3	31.9
* = p-value < 0.05								

Background Characteristics		Knowledge and Awareness score	Interacting with BHNSI		Maintain HNS registers		Spent time on HNS activity in past week	
		Average score	No	Yes	No	Yes	No	Yes
	Completed 11th /12th grade (higher secondary school)	20.8	32.8	31.6	30.7	33.2	32.7	30.6
	Completed 13 + years of schooling	20.7	24.7	21.7	22.3	23.6	22.8	23.8
Marital status	Currently married	19.3	79.7	82.0	80.7	81.2	80.9	81.3
	Currently not married	21.4	20.3	18.0	19.3	18.8	19.1	18.8
Own a mobile phone	Personal	18.7	85.6	93.5*	87.0	91.9	88.9	92.5
	Shared	21.3	14.4	6.5*	13.0	8.2	11.1	7.5
Type of mobile phone	Basic brick phone	20.8	74.9	76.5	79.8	73.0	75.4	76.9
	Featured phone	21.2	16.2	16.1	12.6	18.5	16.4	15.6
	Smart phone	23.0	5.5	7.12	4.2	7.8	6.0	7.5
Length of association	Average months of association with JEEViKA	-	22.6	38.6*	23	37*	30.1	34.5*
Work duration	< 18 hours	20.7	52.4	48.0	58.0	44.7*	54.8	36.9*
	≥ 18 hours	21.3	47.6	52.0	42.0	55.3*	45.2	63.1*
* = p-value < 0.05								

Table 5

Multivariate regression showing effect of HNS training, and other characteristics on HNS knowledge and activities

		Model A: Knowledge Scores	Model B: Interaction with BHNSI	Model C: Maintain HNS register	Model D: Spent time on HNS activity in past week
		Beta coef. (SE)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Received training on HNS (Ref: No)		0.96* (0.06)	1.61* (1.46– 1.77)	2.03* (1.79– 2.31)	1.15* (1.08–1.22)
Age (Ref: 18– 24 years)	25–34 years	1.13* (0.46)	1.77* (1.00– 3.14)	1.20 (0.66– 2.18)	1.24 (0.73–2.12)
	35+ years	1.28* (0.53)	1.11 (0.58– 2.13)	1.13 (0.57– 2.24)	0.99 (0.53–1.83)
Caste (Ref: Scheduled castes/Scheduled tribes)	Other backward castes	-0.33 (0.43)	1.22 (0.73– 2.05)	0.95 (0.53– 1.69)	0.98 (0.60–1.59)
	General	-0.79 (0.64)	0.90 (0.40– 2.00)	1.75 (0.77– 3.97)	1.43 (0.70–2.91)
Education (Ref: 0–8 years of schooling)	Completed 9th /10th grade (high school)	-1.05 (0.59)	0.86 (0.43– 1.72)	0.48 (0.22– 1.03)	0.62 (0.33–1.18)
	Completed 11th /12th grade (higher secondary school)	-0.24 (0.61)	0.97 (0.48– 1.97)	0.98 (0.44– 2.14)	0.62 (0.32–1.21)
	Completed 13+ years of schooling	-0.25 (0.65)	0.86 (0.40– 1.86)	1.00 (0.43– 2.29)	0.67 (0.33–1.37)
Marital status	Currently married	1.17* (0.51)	0.72 (0.38– 1.35)	1.00 (0.51– 1.95)	0.90 (0.50–1.62)
Own a mobile (Ref: Shared mobile)	Personal mobile	0.74 (0.57)	2.06* (1.03– 4.11)	1.09 (0.54– 2.20)	1.19 (0.59–2.37)

* = p-value < 0.05

		Model A: Knowledge Scores	Model B: Interaction with BHNSI	Model C: Maintain HNS register	Model D: Spent time on HNS activity in past week
Duration of association: Average months of association with JEEViKA		0.03* (0.01)	1.04* (1.02–1.05)	1.02* (1.01–1.04)	1.00 (0.99–1.01)
Weekly work duration (Ref: <18 hours)	18 hours or more	0.12 (0.34)	0.90 (0.60–1.37)	1.67* (1.07–2.59)	2.10* (1.42–3.10)
* = p-value < 0.05					

An analysis of the key outcomes of interest among CMs showed that average knowledge score was 21.0. In addition, just over half (54.4%) had interacted with BHNSI over the past year, three-fifths (60%) were capturing HNS indicators, and around a quarter (26.9%) had carried out HNS related activities in the past week. Average score for knowledge was higher for those who received training (23.7) versus those who did not (16.5). Also, those who have received training on HNS-related topics, were working in the JTSP blocks, were 25 years/older, had a longer association with JEEViKA, were more likely to have greater knowledge on HNS topics and were carrying out various HNS-related activities as compared to their counterparts. Furthermore, CMs who were currently married, had feature/smart phones and reported working for more than 18 hours/week had more knowledge of HNS than their counterparts. We then ran multivariate analyses for each of the outcomes of interest in order to identify key factors associated with the uptake of HNS knowledge and behaviors.

The multivariate analyses suggested that CMs who received HNS training were positively associated with having better knowledge around HNS topics ($\beta = 0.96$, $SE = 0.06$) and had significantly higher odds of interacting with BHNSI ($OR = 1.61$; $CI = 1.46–1.77$; $p < 0.001$), capturing HNS indicators ($OR = 2.03$; $CI = 1.79–2.31$; $p < 0.001$) and carrying out HN activities in the past week ($OR = 1.15$; $CI = 1.08–1.22$; $p < 0.001$). Also, knowledge around HNS topics increased with age and duration of association with JEEViKA. CMs who were currently married were likely to have 1.17 points of higher score of knowledge on HNS topics. CMs who were 25–34 years and owned their own mobile phone have greater odds of interacting with BHNSI than younger CMs and those not owning their own phone. For every one month increase in association with JEEViKA, the odds of interacting with BHNSI ($OR = 1.04$; $CI = 1.02–1.05$; $p < 0.001$) and capturing HNS indicators ($OR = 1.02$; $CI = 1.01–1.04$; $p < 0.001$) routinely increased. Similarly, those who worked more than the average 18 hours a week had higher odds of capturing HNS indicators routinely ($OR = 1.67$; $CI = 1.07–2.59$; $p < 0.025$) and spending time on HNS activities over the past week ($OR = 2.10$; $CI = 1.42–3.10$; $p < 0.001$) than those working fewer hours.

During the survey, CMs were asked as to the factors that motivated them to layer HNS onto their existing tasks. They cited that additional trainings had boosted their confidence in guiding others and thus

experiencing the joy of benefitting others; another motivating factor was increased remuneration they were receiving as a result of the added tasks. CMs also stated that they were satisfied with their work environment, primarily for receiving adequate opportunities to contribute ideas to improve services within JEEViKA, getting opportunities for training, having supplies and equipment available for work such as training materials, and having a balanced workload relative to their available time. One block project manager sums up the effort saying,

“Overall time allocation in HNS related activities has increased”.

Discussion

In the first year and half of its implementation, JEEViKA collaborated with JTSP to layer HNS programming across all levels of the system. At the centralized levels, JEEViKA circulated an internal memo familiarizing everyone on the role of JTSP and the introduction of programming around HNS across the organization. HNS-related roles and responsibilities have been defined for its various cadre. Staff report the need for increased internal coordination to carry out their new tasks coupled with routine field visits, meetings and consultations to implement HNS programming effectively. Their motivation to carry out these activities is fueled by encouragement and support from supervisors and gaining confidence through trainings which result in increased ability to share HNS messages and greater respect within the community. These findings are supported by previous literature showing that strengthened coordination, continued feedback and receiving appreciation and respect from superiors and clients alike is a key motivator for staff to pick up new additional tasks and perform them with zeal and enthusiasm (29–31). Community operational manuals have been revised to layer HNS programming as new SHGs are being formed thus articulating the integral element of HNS layering within the formation of new groups. At the block level, BHNSI have been appointed to support HNS activities across the 101 intensive blocks. Hailed as a great asset, BHNSI are integral to coordinating across various JEEViKA departments, and linking the state and district-level officials to activities on the ground. At the village level, JEEViKA, along with SHG members comprising the health sub-committees, have worked to link SHGs to public health and nutrition services while channeling public funds through VOs to procure food for nutritional needs.

CMs are the driving force for layering HNS within SHGs. They are trained on HNS topics which they are further expected to share monthly in one SHG meeting per group. These trainings have resulted in a dramatic increase in the CMs' knowledge on healthy behaviors and practices related to maternal, neonatal and child health and nutrition. Our findings are in line with existing evidence suggesting that regular members from a community with a non-health background can be trained to share basic health and nutrition preventive messages (32–34). This knowledge is translated into action by sharing messages in health meetings, making home visits to share information with family of the SHG members especially if the family member is a pregnant woman or mother of a young child, and connecting with BHNSI and others regularly to discuss updates on their activities. CMs also collect and report on HNS indicators regularly which are collated and reviewed periodically across the organization signaling a united commitment to HNS layering. Furthermore, CMs who have been trained express increased self-

confidence in dealing with situations related to accessing health services and speaking to frontline workers, compared to those who haven't been trained. This finding is supported through existing evidence showing that trainings of community health workers resulted in increased confidence in sharing messages, desire to learn more, and motivation to serve with a greater sense of responsibility to care for fellow community members (35, 36). Longer association with JEEViKA was associated with greater odds of carrying out HNS layered activities, such as interacting with block staff and maintaining the HNS register. These findings are consistent with previous studies showing that increased association with a health program led to increased self-consciousness to carry out health-related activities and stay motivated (26, 27). Our findings also suggest that CMs appear to have flexible working hours and manage to carry out their duties in addition to their household tasks and economic activities they are pursuing. These findings suggest that CMs' flexible working hours are critical to enabling them to stay employed which is consistent with other studies that have shown that flexible working hours for women is helpful to them in staying committed and being satisfied with their job (37, 38). In summary, across the assessment, the CM's role has been acknowledged as a critical one in ensuring HNS layering within JEEViKA.

Limitations

This assessment's limitation is that we have collected one time point of data with no prior information on the knowledge, attitudes and competencies of JEEViKA staff. We have tried to address this limitation by interviewing staff from districts and blocks where JTSP is being implemented intensively on the ground and in blocks where only state-level changes have been mandated. We did not collect data from another state as sociodemographic differences across states are stark coupled with different approaches to running SHG programs. The second limitation of this study is that data were self-reported by those who had received training and those implementing the layering of HNS onto their existing activities. This was countered through deliberate questioning and probing using senior research staff along with asking of objective research questions related to knowledge, implementing HNS layering, among others.

Conclusion

In summary, this assessment shows a great degree of commitment from JEEViKA to integrate HNS within its structure, system, and strategies. This is coupled by JTSP's efforts in enhancing and accelerating the layering of HNS programming within JEEViKA. JTSP has achieved this through the training of grassroots functionaries resulting in increased knowledge, allocating BHNSI at a more decentralized level of the block who report directly to block managers, and adding HNS indicators within the MIS, among others. These efforts have further led to an increased awareness and knowledge on HNS issues resulting in increased confidence, desire to learn more on HNS subjects and motivation to support SHG members in the practice of healthy maternal, neonatal and child behaviors. Furthermore, SHG women are encouraged to seek health and nutrition services, and support others in the community through their role as health sub-committee members.

A primary acknowledgement of this assessment is that HNS integration requires a high level of technical expertise. In addition, time and effort are needed to integrate HNS within JEEViKA's mandate and activities for the long term. Programs looking to integrate a new technical component into an existing government led program can utilize a similar approach. Day long training sessions are effective methods to educate grassroots functionaries on HNS topics; practical sessions coupled with didactic training are however preferred. With receptivity prevalent for such knowledge among SHG women, CMs report gaining confidence in sharing HNS information within their communities. JEEViKA needs to keep in mind the existing burden of work of current staff. More deliberate efforts are needed to address time burden on grassroots functionaries by reallocating some of their work to other staff. As JEEViKA establishes new groups across the state, introducing trainings on HNS to newly inducted CMs will integrate such programming further. In addition, specialized support is needed, for example, through the presence of more decentralized staff, such as at the cluster/village-level who solely support this work. This will enable the program to be integrated further and ensure sustained efforts over time.

Declarations

Ethics approval and consent to participate: *The study was reviewed and approved by the institutional review board of the Population Council. Ethical approval for the study was sought from the institutional IRB. A comprehensive informed consent process was followed, with respondents informed about the study, including the interview's duration (approximately 45 minutes), and their queries addressed before written consent was taken. A copy of the written consent was provided to respondents for their records. Participants were not given any monetary compensation for their time.*

Consent for publication: *Written consent was taken from all participants to participate in the study and share the findings from this study. A hard copy of the consent form was left with the participant for their records.*

Availability of data and materials: *The datasets generated and/or analyzed during the current study are available in the Harvard Dataverse repository, <https://doi.org/10.7910/DVN/PKETRB>.*

Competing interests: *All authors declare that they have no competing interests.*

Funding: *This evaluation study was funded to Population Council by the Bill and Melinda Gates Foundation (#OPP1141832). The Population Council had designed and conducted the study on their own. The funders had no role in study design, data collection, data analysis or interpretation and decision to publish. The collaboration with colleagues from the program implementing organization was around the analyses and interpretation of the findings while writing this manuscript.*

Authors' contributions: *LI conceptualized the study, led the data collection, guided the analysis and drafted the paper. S conducted the analysis. JS and IC reviewed and provided inputs to the manuscript. All authors read the approved the final manuscript.*

Acknowledgements: The authors acknowledge the support from the implementing organization, the government entity supporting self-help groups, and the men and women who participated in this study.

References

1. UNICEF. *Infant and child mortality in India: Levels, Trends and Determinants*. New Delhi, India: UNICEF, Indian Statistical Institute, NIMS-ICMR2015.
2. World Health Organization. *Trends in Maternal Mortality: 1990 to 2015 WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division 2015*.
3. Sankar MJ, Neogi SB, Sharma J, Chauhan M, Srivastava R, Prabhakar PK, et al. State of newborn health in India. *J Perinatol*. 2016 Dec;36(s3):S3-S8.
4. Census of India. Bihar's Annual Health Survey- Fact Sheet. In: *Vital Statistics Division-Office of the Registrar General & Census Commissioner I, editor*.2012-13.
5. World Health Organization. *Essential newborn care: report of a technical working group 1994 25-29 April 1994*.
6. Kumar GA, Dandona R, Chaman P, Singh P, Dandona L. A population-based study of neonatal mortality and maternal care utilization in the Indian state of Bihar. *BMC Pregnancy Childbirth*. 2014 Oct 17;14:357.
7. Manandhar DS, Osrin D, Shrestha BP, Mesko N, Morrison J, Tumbahangphe KM, et al. Effect of a participatory intervention with women's groups on birth outcomes in Nepal: cluster-randomised controlled trial. *Lancet*. 2004 Sep 11-17;364(9438):970-9.
8. Morrison J, Thapa R, Hartley S, Osrin D, Manandhar M, Tumbahangphe K, et al. Understanding how women's groups improve maternal and newborn health in Makwanpur, Nepal: a qualitative study. *Int Health*. 2010 Mar;2(1):25-35.
9. Rath S, Nair N, Tripathy PK, Barnett S, Mahapatra R, Gope R, et al. Explaining the impact of a women's group led community mobilisation intervention on maternal and newborn health outcomes: the Ekjut trial process evaluation. *BMC Int Health Hum Rights*. 2010 Oct 22;10:25.
10. Tripathy P, Nair N, Barnett S, Mahapatra R, Borghi J, Rath S, et al. Effect of a participatory intervention with women's groups on birth outcomes and maternal depression in Jharkhand and Orissa, India: a cluster-randomised controlled trial. *Lancet*. 2010 Apr 03;375(9721):1182-92.
11. Saggurti N, Atmavilas Y, Porwal A, Schooley J, Das R, Kande N, et al. Effect of health intervention integration within women's self-help groups on collectivization and healthy practices around reproductive, maternal, neonatal and child health in rural India. *PLoS One*. 2018;13(8):e0202562.
12. Saggurti N, Porwal A, Atmavilas Y, Walia M, Das R, Irani L. Correction: Effect of behavioral change intervention around new-born care practices among most marginalized women in self-help groups in rural India: analyses of three cross-sectional surveys between 2013 and 2016. *J Perinatol*. 2019 May 2.

13. Sgaier SK, Anthony J, Bhattacharjee P, Baer J, Malve V, Bhalla A, et al. Strengthening government management capacity to scale up HIV prevention programs through the use of Technical Support Units: lessons from Karnataka state, India. *Glob Health Sci Pract*. 2014 Nov 25;2(4):444-58.
14. Pelletier D, Gervais S, Hafeez-Ur-Rehman H, Sanou D, Tumwine J. Boundary-spanning actors in complex adaptive governance systems: The case of multisectoral nutrition. *Int J Health Plann Manage*. 2018 Jan;33(1):e293-e319.
15. Zaidi S, Bhutta Z, Hussain SS, Rasanathan K. Multisector governance for nutrition and early childhood development: overlapping agendas and differing progress in Pakistan. *BMJ Glob Health*. 2018;3(Suppl 4):e000678.
16. BRLPS. Organization Structure. Bihar Rural Livelihoods Promotion Society Webpage: Bihar Rural Livelihoods Promotion Society; 2009-2010 [cited 2019 21st May]; Webpage designed by Rolta]. Available from: <http://brlp.in/web/brlp/organogram>.
17. BRLPS. Roles and Responsibility of JEEViKA staff. [Webpage] Bihar Rural Livelihood Promotion Society Webpage: Bihar Rural Livelihood Promotion Society 2009-2010 [cited 2019 21st May]; Available from: <http://brlp.in/web/brlp/roles-and-responsibility>.
18. BRLP. Project Implementation Plan-JEEViKA. Bihar Rural Livelihood Project Webpage 2006-07; 209]. Available from: <http://brlp.in/documents/11369/37104/BRLP+Project+Implementation+Plan.pdf/406c3cad-5a82-4377-9a06-f948d7c1fda5>
19. Adler R, Wilson K, Abbot P, Blackshaw U. Approach to monitoring and evaluation of institutional capacity for adaptation to climate change: The case of the United Kingdom's investment to Ethiopia's climate-resilient green economy. In: Bours D, McGinn C, Pringle P, editors. *Monitoring and evaluation of climate change adaptation: A review of the landscape New directions for evaluation* 2015. p. 61-74.
20. Bergeron K, Abdi S, DeCorby K, Mensah G, Rempel B, Manson H. Theories, models and frameworks used in capacity building interventions relevant to public health: a systematic review. *BMC Public Health*. 2017 Nov 28;17(1):914.
21. Management Sciences for Health. *Management and Organizational Sustainability Tool: A Guide for Users and Facilitators*. Cambridge, MA: Management Sciences for Health 2010.
22. Scientific Software Development GmbH. ATLAS.ti. 2019 [cited 2018 May 25]; Available from: <https://atlasti.com/>.
23. United States Census Bureau. CSPro 6.3. United States Census Bureau; 2016 [cited 2019 March 05]; Available from: <https://www.census.gov/data/software/cspro.Overview.html>.
24. STATA. STATA 13. 2016 [cited 2018 June 15]; Available from: <https://www.stata.com/>.
25. Atkins AS, Stroescu I, Spagnola NB, Davis VG, Patterson TD, Narasimhan M, et al. Assessment of Age-Related Differences in Functional Capacity Using the Virtual Reality Functional Capacity Assessment Tool (VRFCAT). *J Prev Alzheimers Dis*. 2015 Jun;2(2):121-7.

26. Borgohain H, Saikia JP. Job Satisfaction of Anganwadi Workers: A Study in Sivasagar District of Assam. *International Journal of Innovative Research in Science, Engineering and Technology*. 2017;6(9):19372-81.
27. Hotchkiss DR, Banteyerga H, Tharaney M. Job satisfaction and motivation among public sector health workers: evidence from Ethiopia. *Hum Resour Health*. 2015 Oct 29;13:83.
28. Menezes LM, Kelliher C. FlexibleWorking and Performance: A Systematic Review of the Evidence for a Business Case. *International Journal of Management Reviews*. 2011;13:452–74.
29. Dieleman M, Cuong PV, Anh LV, Martineau T. Identifying factors for job motivation of rural health workers in North Viet Nam. *Hum Resour Health*. 2003 Nov 5;1(1):10.
30. Kok MC, Muula AS. Motivation and job satisfaction of health surveillance assistants in Mwanza, Malawi: an explorative study. *Malawi Med J*. 2013 Mar;25(1):5-11.
31. Ram DP. Relationship between Job Satisfaction and Job Performance in the Public Sector-A Case Study from India. *International Journal of Academic Research in Economics and Management Sciences*. 2013:20.
32. Agarwal A, Gallo M, Finlay A. Evaluation of the Quality of Community Based Integrated Management of Childhood Illness and Reproductive Health Programs in Madagascar: Prepared for the United States Agency for International Development through the President's Malaria Initiative2013.
33. Akintola O, Chikoko G. Factors influencing motivation and job satisfaction among supervisors of community health workers in marginalized communities in South Africa. *Hum Resour Health*. 2016 Sep 6;14(1):54.
34. Seman K, Yaacob H, Hamid AM, Ismail AR, Yusoff A. Evaluation of a training programme for non-health professionals as oral health educators. *Malays J Med Sci*. 2008 Apr;15(2):33-8.
35. Gopalan SS, Mohanty S, Das A. Assessing community health workers' performance motivation: a mixed-methods approach on India's Accredited Social Health Activists (ASHA) programme. *BMJ open*. 2012;2(5).
36. Lunsford SS, Fatta K, Stover KE, Shrestha R. Supporting close-to-community providers through a community health system approach: case examples from Ethiopia and Tanzania. *Hum Resour Health*. 2015 Mar 28;13:12.
37. Orpen C. Effect of Flexible Working Hours on Employee Satisfaction and Performance: A Field Experiment. *Journal of Applied Psychology*. 1981;66(1):113-5.
38. Scandura TA, Lankau MJ. Relationships of Gender, Family Responsibility and Flexible Work Hours to OrganizationalCommitment and Job Satisfaction. *Journal of Organizational Behavior*. 1997;18(4):377-91.

Figures

Figure 1

Monitoring and evaluation framework for the assessment of capacity building and support being provided to JEEViKA

Figure 2

Average time spent by community mobilizers (CMs) over various activities in the past 24 hours