Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
Women’s access to agriculture extension amidst COVID-19: Insights from Gujarat, India and Dang, Nepal

Muzna Alvi a,⁎, Prapti Barooah a, Shweta Gupta a, Smriti Saini b

a Environment and Production Technology Division, International Food Policy Research Institute (IFPRI), New Delhi, India
b South Asia Regional Office, IFPRI, New Delhi, India

ARTICLE INFO

Keywords: Gender Extension South Asia COVID-19 Resilience Ethnicity

ABSTRACT

COVID-19 induced lockdowns have had far reaching impacts on the rural sector, particularly on women farmers. These impacts have been exacerbated by lack of access to reliable and timely agriculture information. Using panel phone survey data from India and Nepal, we study how women’s access to agricultural extension was impacted by the lockdowns and its effect on agricultural productivity. We find that women’s already low access to formal extension was reduced further, leading to an increased reliance on informal social networks. In both countries, nearly 50% farmers reported negative impacts on productivity due to inaccessibility of information during the lockdown. In India, we find that access to formal extension is mediated by crop type, geographic location and caste identity. We discuss ways in which extension systems in India and Nepal can be made more inclusive and resilient to future crisis, including by adapting group and community-based approaches to post-pandemic best practices.

1. Introduction

As South Asia reels from the impact of COVID-19 lockdowns on losses of jobs and incomes, including income from remittance which is a crucial financial lifeline for rural households in the region (Ullah, 2017; Jawaid and Raza, 2016), a growing proportion of rural households are more likely to rely on income from agriculture for sustenance (The Wire, 2020). Boosting agricultural productivity and maximizing returns from agriculture has become critical in the aftermath of the current pandemic. In this context, agricultural extension services will be instrumental in providing timely and accurate information to farmers – women and men alike – towards enhancing productivity and ensuring food security (Chander, 2020; Chander, 2020).

While gender plays an important role in mediating access to agricultural information and extension (Gumucio et al., 2019), gender-responsive extension services continue to be largely inadequate, especially in South Asia (FAO and CARE, 2019; Dhenge et al., 2016; Jost et al., 2016; Khan et al., 2016; UN Women, 2017a, 2017b, 2017c). This is despite women playing a significant role in agriculture in the region (Nosheen et al., 2009; Javed et al., 2006). The pandemic and resulting lockdowns have only exacerbated the need for reliable and timely information on input and output market access, diseases and pests, insurance, and credit. Recognizing the inequalities that limit women’s access to information and the disproportionate economic burden faced by them in times of crisis (CARE, 2020; UN Women, 2017a, 2017b, 2017c), there is now a compelling need for building resilient and inclusive systems of agriculture extension and information.

The current crisis has laid bare the disproportionate impacts being faced by women farmers (Shrestha and Leder, 2020; Harris et al., 2020; Sarkar, 2020). This has been aggravated by mass return-migration of men that has reduced women’s access to remittances, and a sudden increase in rural labor supply that could depress rural wages, increase competition for scarce jobs and is likely to push women out of remunerative work both on and off farm (Puskur et al., 2020). Pandemic related restrictions on mobility are reinforced by already existing social norms and increased care duties, that limit women’s ability to seek information outside their immediate social networks.

This leads to some important questions: What was the impact of Covid-19 induced lockdowns on women’s access to formal and informal agriculture extension sources? How did it impact agriculture productivity? How can the agriculture extension system be made more resilient and gender inclusive? We explore these questions using panel phone
survey data of over 220 women farmers from Gujarat in India and over 750 farmers -both male and female- from Dang district in Nepal. In both countries a large proportion of the population is still dependent on agriculture as a means of livelihood and unlike other countries in south Asia, more than 80% of female workforce continues to be employed in agriculture (Srivastava and Srivastava, 2009; ILO, 2017). Findings from this study can help in formulating policies that address the needs of women farmers and safeguard their livelihoods in situations of crisis, especially in South Asia.

2. Gender and extension systems in India and Nepal

The formal agriculture extension system in India relies on public sector institutions, with the Ministry of Agriculture and Farmer’s Welfare at the central level; State Agricultural Universities and the State Department of Agriculture, Cooperation and Farmer’s Welfare at the state level; and the District Department of Agriculture, Animal Husbandry, Horticulture, Fisheries, Krishi Vigyan Kendras and Agriculture Technology Management Agency (ATMA) at the district level. Private input companies, and smaller fertilizer dealers also form an important source of information for farmers, especially in remote areas where formal extension systems are lacking. Additionally, many civil society and grassroots organizations are also involved in agriculture extension activities in different parts of the country (Nandi and Nedumaran, 2019; Gulati et al., 2018; Raabe, 2008).

Over the last three decades, agriculture extension has undergone a paradigm shift, away from the traditional and top-down “training and visit” approach, to a more decentralized, participatory and demand-driven approach. Special provisions have been made in various national schemes to facilitate mainstreaming of women farmers. Under the ATMA scheme, 30% of the total budget allocation in all on-going schemes and programs are earmarked for women beneficiaries (UN Women, 2017a, 2017b, 2017c). Nonetheless, women’s lack of access to extension services has persisted. For example, since its inception in 2005–06 till December 2018, only one-fourth of the total participants for farmer-oriented activities like exposure visits, trainings, demonstrations, farm schools and Kisan Melas under ATMA schemes, were women (MoAFW, 2019).

In Nepal, agriculture extension was formally given priority in the First Five Year Plan in 1956. District Agriculture Development Offices (DADOs) were gradually opened in districts to provide information on improved farming techniques using traditional extension methods. Since its creation in 1992, Nepal Agriculture Research Council has become the main agricultural research center in the country. The Eighth Development Plan (1992-1997) put a special focus on promoting Agriculture Service Centers (ASCs) wherein farmer groups were mobilized by model farmers to undertake extension activities. The Government of Nepal adopted a Gender Equality and Social Inclusion (GESI) framework in the 2008–2010 Three Year Interim Plan with the objective of ensuring inclusive growth by eliminating structural barriers (Thapa et al., 2013), which the Agriculture Development Strategy also emphasizes (Government of Nepal, 2014). A large portion of formal extension activities in Nepal are donor funded with support from international organizations. More recently, there has been an increase in community-based extension services, with the emergence of agriculture cooperatives, NGOs, farmer organizations and community-based organizations (CBOs) as key providers of inputs, seeds, and extension services (Gauchan, 2003). The formal system, however, continues to be fragmented, and marred by lack of coordination and resources, as well as shortage of human resource. While policies highlight the need to conduct gender sensitive research and dissemination of technologies, they fail to provide a clear strategy or action plan to meet those objectives (Paudyal et al., 2019).

In this vacuum, small private agricultural input dealers, called agro-vets or agro-dealers, have emerged as the single most important source of information for farmers.

3. Study context and data

The first cases of COVID-19 in India and Nepal were reported in late January 2020, following which, in mid-March, strict lockdowns were imposed in both countries, restricting movement of all but essential goods (Karki, 2020; Singh et al., 2020).

Our study uses data from three different surveys that were conducted amidst the COVID-19 pandemic. The first survey was conducted in Gujarat, a western state in India. The second survey was conducted in Dang, a district located in mid-western Nepal. The broad aim of these two surveys, henceforth referred to as gender surveys, was to understand the gendered impact of COVID-19 lockdowns on food and water security, income, livelihoods, mobility and household violence and conflict among poor and vulnerable groups. In total, five rounds of the gender surveys are planned through the end of 2020. In this paper, we use data from first two rounds for both regions. In Gujarat, the first round was conducted in May-June which was just before the sowing stage for kharif (monsoon) crops and the second round in August-September, which was just before the kharif crop is harvested (Fig. 1). In Dang, the first round was conducted in early July and second round in September. Our results are based on the agriculture extension module of the survey that covers changes in access, quality and frequency of agricultural information and extension, and impacts on agriculture productivity. Where available, we have drawn results from other parts of the survey to highlight issues of access to agricultural inputs and markets.

The third type of data used in this paper comes from two rounds of the agriculture surveys that were conducted in Dang, Nepal around the same time as the gender surveys with the same sample, to understand diffusion of integrated pest management knowledge and practices among maize farmers (hereafter referred to as agriculture survey). These surveys provide information on certain key variables which were not included in the gender surveys in Dang. Unless otherwise mentioned, the results and findings in this paper are drawn primarily from gender surveys.

4. Sampling and methods

In India, our respondents are all women, who are members of Self-Employed Women’s Association (SEWA), a trade union of women that operates as a collection of affiliated self-help groups (SHG). The surveys were conducted in nine districts in the Indian state of Gujarat, where SEWA has a strong presence. We selected our respondents from SEWA membership lists. We received a list of 860 potential respondents from SEWA with approximately 100 contact numbers per district. Out of 860, 627 respondents were selected using simple random sampling and were surveyed in the first round. All potential respondents had been informed in advance by the SEWA staff to expect our call. In the second round, we were able to reach 567 respondents, translating to an attrition rate of 3. Examples include leading NGOs such as SEWA, PRADAN, BAIF and Syngenta Foundation

2 Examples include National Mission on Agricultural Extension & Technology-Sub-Mission on Agricultural extension, ATMA, Agri-Clinics and Agri-Business Centers (ACABC), Mass media support to agricultural extension by allocating one day for issues concerning women farmers in programs aired by All India Radio & Doordarshan, Mission for Integrated Development of Horticulture, National Mission for Sustainable Agriculture, and training programmes on gender friendly equipment for women farmers.

4 Ahmedabad (both urban and rural), Anand, Arvalli, Chota Udaipur, Gandhinagar, Kutch, Mehsana, Patan and Surendranagar
9.5%.

Women engaged in on-farm, off-farm, and non-farm activities in rural, peri-urban, and urban areas were surveyed. In this paper we only report results from the approximately 228 women (40% of the total surveyed), who report farming as their main agricultural activity.

In Nepal, the sample for the gender survey was selected using systematic random sampling from an in-person listing of maize farmers across four rural municipalities of Dang district- Lamahi, Shantinagar, Dangisharan and Rapti, carried out in February 2020. The sample size for the first round of the gender survey was 759, which included 540 females (71.1%) and 219 male respondents. For the second round of the gender survey, we were able to reach 690 farmers of the round 1 farmers- 490 females (71%) and 200 males- with an attrition rate of 9%.

Of the 690 respondents who participated in both rounds of the gender survey, there are 664 respondents who also participated in both rounds of the agriculture survey in Dang. This includes 476 female (71.7%) and 188 male respondents. To maintain consistency across the two countries, we report findings only for women farmers in this paper. We acknowledge the lack of access to data from male respondents in Gujarat as a limitation of our paper. For all the results reported in the paper, corresponding findings for the male respondents in Dang have been mentioned in the Appendix.

The module on agriculture extension in the gender survey asked respondents to report their primary source of agriculture information, and if it was available to them during and after the lockdown. The respondents who said their main source was unavailable, were asked about the alternative sources of information they had to rely on. In both cases, we asked respondents to comment on the quality, frequency and timeliness of information received, and if their farm has suffered due to their inability to access timely extension and information. In the second round of the survey, the same module was administered in both the locations to track changes over time. The detailed extension module has been included in the Appendix (Table A.1.i for Round 1 and Table A.1.ii for Round 2).

All surveys were conducted remotely over phone using the Computer Assisted Telephone Interviews (CATI). All three questionnaires were pretested before conducting actual surveys and translated into the local language- Gujarati in Gujarat and Nepali in Dang.

5. Results

5.1. Descriptive statistics

In Gujarat, the mean age of participants was around 40 years and 26% respondents had no formal schooling while only 7% reported completing more than secondary education. Over 90% were married, and a majority lived in male-headed households. In round 1, 78% of the respondents said their household had suffered an income loss due to the lockdown while this figure was, 51% in round 2. Gujarat does not experience any significant out-migration and only 3% of respondents said that any household member had migrated for work in the last 1 year (see Appendix Table A.2.i for descriptive statistics for Gujarat).

In Dang, the mean age of participants was similar to India at around...
35 years. In terms of schooling, 34% women had no formal schooling, and very few had completed schooling beyond secondary level. Almost all respondents (93%) reported being married, and around 75% of the them were from male-headed households. Agriculture and allied activities were the primary occupation for 84% of the women with nearly 80% growing staple crops. More than 85% households had suffered a loss of income due to the lockdown. Unlike India, Nepal experiences high out-migration and around 46% of the total households surveyed in Dang reported out-migration, predominantly male (93%); of which around 40% had returned due to COVID-19 related lockdowns (see Appendix Table A.4).

5.2. Impact of lockdown on agriculture and extension sources

a. Sources of agriculture extension before lockdown

Prior to lockdown, the reliance of women on government sources of extension was very low. In Gujarat, a majority of respondents reported to have relied on traditional knowledge (47%) as their primary source for information on matters related to agriculture before the lockdown (Fig. 2). Despite the respondents in India being affiliated to SEWA, which delivers group-based extension services among its members, only 18% respondents reported group meetings as their major source of information on agriculture. The use of either government extension agents or input dealers as primary sources of information was low.

Unlike Gujarat, in Dang agricultural input retailers were used by majority of the women farmers as a primary source of information before the lockdown (59%). A high proportion of women also reported relying primarily on group-meetings for information on agriculture before the lockdown. Dependence of women farmers on government extension agents or officials from Agriculture Knowledge Centres (AKC) was found to be very low prior to the lockdown.

b. Sources of extension after lockdown

In Gujarat, 27% women reported their primary or regular source of information as being unavailable or inaccessible due to COVID-19 lockdown in round 1. For Dang, this figure was 29% in round 1. Respondents who reported that their primary source of extension was unavailable during the lockdown (round 1) were asked about their alternative sources of information during this time. In Gujarat, the immediate impact of the lockdown was reduced reliance on community-based sources of information, like group meetings and field days and a shift towards farmers’ social network of family and friends. In Dang, information sources that involved in-person interactions such as agricultural input dealers and meetings convened by SHGs, cooperatives, and other farmer groups, saw a decline during the lockdown. At the same time, an increased proportion of farmers reported depending on traditional knowledge and information from family members or neighbors during this period (see Appendix Table A.3).

Among sources that were unavailable, availability of agriculture extension agents was worst hit in Gujarat with more than 50% of those who had reported them to be their primary source of information, reporting them to be unavailable during the lockdown. In Dang, availability of information from mass media sources (35%), group meetings (31%) and agro-dealers (29%) were most affected due to the lockdown (see Appendix Table A.4).

By round 2, significant changes were observed in sources of information used. While traditional knowledge continued to be the primary source of information in Gujarat, the reliance on government extension agents further fell to 0. Instead, a growing reliance was reported on SEWA and input dealers (Fig. 2). In Dang, while dependence on agro-dealers continued to be low in the second round of the survey, a slightly higher proportion of respondents reported relying on group meetings as their primary source of information in the second round. Moreover, traditional knowledge emerged as the primary source of information for one-fourth of the respondents during the second round.

c. Impact of lockdown on Quality of information

Findings from the survey on post-lockdown quality of agricultural information are mixed. In Gujarat in round 1, nearly 80% respondents said the quality of information available to them was the same as before lockdown. This remained unchanged, in round 2, with nearly 80% of the respondents in Gujarat reporting no change in quality or frequency of information from the last round (Table A.6 and Table A.7)

Respondents in Dang reported more acute concerns over quality at the beginning of the lockdown. In round 1, around 53% respondents in Dang reported that the overall quality of information received by them from various sources had worsened since the lockdown. Around 62% respondents felt that they could not access timely information as information access was more infrequent compared to pre-lockdown. By round 2, quality of extension was perceived to be better by around 30% respondents and a considerably lower proportion of respondents (18%) reported that the quality of agricultural information had worsened over the last month. Concerns over infrequent information access persisted in September with 31% respondents who were dissatisfied with the frequency of information; however, it is encouraging that around 23% perceived it to be better as compared to the situation right after the lockdown (Appendix Table A.6 and Table A.7).

d. Impact on farm productivity

In agriculture dependent economies such as India and Nepal, inability to access credible and timely information by farmers could have serious consequences including increased inefficiencies and reduced productivity of farming operations. We asked farmers whether lack of access to information affected their output based on self-reported agriculture productivity. In Gujarat, 49% of all surveyed farmers reported negative impacts on their farms due to lack of information in round 1. This figure is comparable to Nepal where around 57% of women farmers reported that their productivity had suffered due to their inability to access timely and quality agricultural information during the lockdown. This issue has prevailed even in the second round, with 42% farmers in Gujarat and 56% farmers in Dang, reporting low productivity.

It is interesting to note that in Gujarat, the adverse impact on productivity was experienced more by those who grew staple or horticulture crops (51%) like rice, wheat, and vegetables, as compared to those who grew cash crops (40%). They continued to experience productivity losses even by round 2 with 45% reporting it, while this number declined to 34% for cash crop farmers. However, for Dang, no such variation could be observed for farmers growing different types of crops. Nearly 56% of all farmers (staple crops, horticulture, and cash crops), across both the rounds of survey, reported adverse impact on productivity due to their inability to access credible and timely information.

In round 2, we asked farmers to detail how their farms had been impacted by lack of information (Fig. 3). The most common issues reported by farmers in Gujarat included lower yield and poor quality of yield. Again, most of these issues such as impact on yield were faced by staple/horticulture crop farmers more than others (Appendix Table A.9). On the other hand, most common issues faced by farmers in Dang during the second round of the gender survey were limited availability of inputs, attacks by locusts and FAW,7 and lower quantity of yield. These findings are in line with our findings from the agriculture survey where majority of the respondents (86%) reported experiencing pest

7 Fall Army Worm (FAW) is one of the major invasive pests that attacks crops and causes damage within a very short span of time. Maize is one of its most favorable host resulting in devastating damage which can lead to total crop failure.
in infestation in maize during the summer season and FAW attack was reported by 75% respondents.

e. Heterogeneity of impacts.

Caste, ethnicity and proximity to urban areas are some other factors that often result in differential access to public extension services and can aggravate the impact of crises. In Gujarat, we find that farmers belonging to Schedule Caste (SC) and Schedule Tribe (ST) communities, were much less likely to report government extension agents as their main source of information compared to upper castes and were more likely to rely on their social networks and knowledge for agriculture information (Figs. 3 and 4). This can be linked to constraints such as low educational attainment of those belonging to socially marginalized communities and limited access to productive resources including credit, land and human capital (Krishna et al., 2019; Gupta et al., 2020; Anderson et al., 2006). However, in Dang, we find no ethnicity-based differences in primary source of agriculture information between the two predominant communities in our sample- Chhetris and Janjati (tribals).

In Gujarat, we also find that farmers who lived in districts which had large urban centers, were much less likely to report negative impacts on agriculture productivity due to the lockdown, compared to farmers in more remote districts. This is expected, as information on government measures that could impact availability and access to critical inputs and output markets, are likely to be concentrated in urban and peri-urban areas (Kosec and Ragasa, 2020).

Additionally, for women farmers, factors such as mobility, agency, access to technology, and the issue of time poverty further determine their source, quality and availability of agricultural information. For example, in Dang, although 72% of our sample included female agriculture decision makers, only around 41% of them were primary decision-makers for agricultural decisions. Interestingly, a relatively lower proportion of females (52%) who were the primary agricultural decision maker in their household reported that their farms suffered due to their inability to access quality and timely information during the lockdown, as compared to those who reported their spouse as the primary decision-maker for agricultural decisions (63%). We also find that women in Dang who were educated beyond primary level were more likely to rely on government extension agents as their primary source of

Fig. 2. Primary sources of agricultural information used by women farmers before and after the lockdown (Round 2).

Fig. 3. Problems faced by farmers due to their inability to access timely and quality agricultural information (Round 2)
information as compared to traditional knowledge, although no similar relationship was observed in Gujarat.

6. Discussion and policy recommendation

Globally, COVID-19 has exposed farmers to high levels of income insecurity, underlining the importance of building resilience among farming households. Agriculture extension services have a crucial role to play in this context towards enhancing agricultural productivity and ensuring food security as economies struggle to recover from the negative consequences of the pandemic. In doing so, it is important to acknowledge both women farmers’ crucial role in agricultural systems, as well as factors that have lowered their ability to cope with shocks.

We analyze data from phone surveys conducted during various stages of the lockdown in India and Nepal and find that the pandemic adversely affected women farmer’s access to agricultural extension and agriculture productivity. We also observed heterogeneity in impacts by caste, region, education and crop type. Our findings show an increased reliance on social networks after the lockdown and reduced dependence on formal sources of information which was already low before lockdown. A comparison between two countries shows that while yield is adversely affected in Gujarat, farmers in Dang report concerns about input costs. In our surveys, 78% of women in Gujarat and 37% in Dang reported that they were spending more time on household care activities during the pandemic, compared to participation in these activities (Paul and Kumar, 2016).

We analyze data from phone surveys conducted during various stages of the lockdown in India and Nepal and find that the pandemic adversely affected women farmer’s access to agricultural extension and agriculture productivity. We also observed heterogeneity in impacts by caste, region, education and crop type. Our findings show an increased reliance on social networks after the lockdown and reduced dependence on formal sources of information which was already low before lockdown. A comparison between two countries shows that while yield is adversely affected in Gujarat, farmers in Dang report concerns about input costs. In our surveys, 78% of women in Gujarat and 37% in Dang reported that they were spending more time on household care activities during the pandemic, compared to participation in these activities (Paul and Kumar, 2016).

ICT-based methods are an effective and cost-efficient means of delivering agro-advisory services to farmers, especially in the current context when social distancing needs to be enforced. Modern extension approaches are increasingly relying on mobile phones and radios for disseminating information. Globally, including in South Asia, the gender gap in mobile ownership is declining and our survey found high mobile phone ownership among women (86% in Gujarat and 91% in Dang). This increased penetration of mobile phones can be especially beneficial for reaching women farmers, in cases where their mobility is restricted due to social and cultural norms.

However, even if women own phones, they may not use it for purposes beyond calling. For instance, in our sample, only 3% farmers in Gujarat reported that they used their phones to make any digital payments. Therefore, upscaling ICT-based methods of extension will require implementers to remain cognizant of gendered access to more advanced resources such as smartphones, computers and internet (Venkatasubramanian et al., 2014; Sanghera, 2018), to ensure that women’s exclusion from these services is not reinforced.

Where smartphones are not available, information and advisories are commonly shared through SMS, which requires a basic level of literacy and comprehension ability. This automatically excludes a vast number of women who are unable to read and write (Chandra, 2019). Social and ethnic identity is another mediating factor that affects women’s access to technology. Women belonging to marginalized communities are generally less educated, have lower access to financial resources and are thus, less likely to have access to assets and technology to avail information (Kiran et al., 2012; Sulaiman and Reddy, 2014). This is confirmed by our surveys in India and Nepal. Nearly 38% of SC/ST women in India reported having no education, compared to 28% women from high-caste groups. For Nepal, around 45% women belonging to Terai Janjati (tribal) community had no formal schooling as compared to 26% women from Chhetri community, considered an upper caste community. Moreover, we find that, lower castes are generally located in remote areas which limits their access to formal extension.Intersectionality of caste and gender-based exclusion can thus doubly disadvantage women farmers from being able to access formal extension system, as is reflected in our findings. One possible solution to this is the use of innovative IVR (interactive voice response) technology that can be used for reaching farmers of all education levels, literacy and even those with access to basic technology (Moloo et al., 2018).

Another important step towards building effective extension approaches has been the introduction of Farmer field schools (FFS), aimed at promoting participatory and inclusive learning. Since these activities take place within the community, they are designed to be sensitive to local contexts and have the potential to reach more women farmers (Chocholata et al., 2016). However, women’s multiple responsibilities mean that they may be unable to spare time from household and care responsibilities to participate in these activities (Paul and Kumar, 2016).

In our surveys, 78% of women in Gujarat and 37% in Dang reported that they were spending more time on household care activities during the lockdown. Moreover, some of these activities may not be amenable to situations where social distancing needs to be practiced.

---

8 This difference is significant at 5% level. No such difference is seen in the sample for men.
Another often talked about issue with the existing extension system in the region, is the lack of female extension workers (GFRAS, 2011). In conservative societies, where interaction with unrelated males is frowned upon, this results in systematic exclusion of women from formal extension and advisory services (Beevi et al., 2018; Vark, 2013). Male extension workers, may themselves limit their interactions only to male farmers, due to both cultural norms, as well as lack of recognition of women’s roles as farmers in the agricultural system. Recent research from Africa shows that the gender of extension agents matters, and female extension agents are more effective in changing behavior of female and male farmers (Kondylis et al., 2016).

Women’s interaction is often restricted to their own community and social network, and our findings also show increased reliance on friends and families as a source of information during the lockdown. According to Indian National Sample Survey Organization (NSSO, 2014) data, community based “progressive farmers” are a critical source for technical advice among agricultural households. However, these “progressive farmers”, are often likely to be upper-caste, male farmers, and thus outside most women farmers’ social network, which is largely confined to family members and immediate community. As a result, women’s access to agriculture information gets significantly limited (Venkatasubramanian et al., 2014; World Bank, FAO, and IFAD, 2015). One solution is to train and promote a cadre of progressive women farmers in communities to act as sources of information and advice.

Group-based approaches have also emerged as a viable solution in the South Asian context for integrating a gender-sensitive perspective into service delivery systems (Raghunathan et al., 2019). Evaluations of key government and NGO-led initiatives suggest that organizing women in homogenous groups has helped in effectively implementing agriculture development initiatives and capacity building of women farmers (Sulaian and Reddy, 2014). Some examples of such government-led efforts include the Aajeekiva programme and Mahila Kisan Sashakti-karan Pariyojana under National Rural Livelihood Mission, the Society for Elimination of Rural Poverty initiative in Andhra Pradesh, and the Kudumbashree model implemented in Kerala. Key initiatives undertaken by NGOs include SHGs formed by PRADAN, and several initiatives by SEWA in Gujarat to support women producer groups towards empowerment and economic self-reliance, including during the pandemic.

Another approach that holds promise is the training and deployment of community frontline workers to increase women farmers’ access to reliable extension. Both India and Nepal have seen significant success with this model in the areas of basic maternal and child health and feeding practices, through the use of ICDS and Anganwadi workers in rural areas (Warrier, 2020). Several Indian states have experimented with this model in agriculture with considerable success, including Kisan Sakhis in Bihar (Munshi, 2016), and Pashu Sakhis for livestock related extension in Rajasthan and Bihar (Ghaswalla, 2015). Since access to reliable information is more compromised in remote rural areas that are far from urban centers, as revealed in our surveys, leveraging frontline workers can ameliorate this issue significantly.

Funding

This study was funded by the Federal Government of Germany (BMZ) for surveys in Gujarat, India and the United States Agency for International Development (USAID) for surveys in Dang as part of Gender-responsive and Climate resiliient for Agriculture for Nutrition initiative (GCAN) and the Cereal Systems Initiative for South Asia (CSISA) with support from the CGIAR Research Program on Policies, Institutions and Markets (PIM) led by IFPRI.

Declaration of Competing Interest

The authors, Muzna Alvi, Prapti Barooah, Shweta Gupta and Smriti Saini declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

We thank the enumerators at All India Disaster Mitigation Institute (AIDMI)-Gujarat, India and Institute for Integrated Development Studies (IIDS)-Nepal for their excellent survey support and the respondents for providing their time for these phone surveys. Comments on earlier drafts by Manavi Gupta and Taha Rauf are gratefully acknowledged.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.agsy.2020.103035.

References

Anderson, J.R., Feder, G., Ganguly, S., 2006. The rise and fall of training and visit extension: an Asian mini-drama with an African epilogue. In: World Bank Policy Research Working Paper 3928. May.

Beevi, C.A., Wason, M., Padaria, R.M., Singh, P., 2018. Gender sensitivity in agricultural extension.Curr. Sci. 115 (6).

CARE, 2020. Gender Implications of COVID-19 Outbreaks in Development and Humanitarian Settings. https://doi.org/10.1080/13552074.2019.1615288.

Chander, M., 2020. COVID-19 Crisis in India: How Extension and Advisory Services Can Help | Agrilinks. May 5. Retrieved from https://www.agrilinks.org/post/covid-19-crisis-india-how-extension-advisory-services-can-help.

Chandra, T., 2019. Literacy in India: the gender and age dimension. In: ORF Issue Brief 23 (5).

Chocholata, L., Allara, M., Impiglia, A., Tagliati, E., 2016. Farmer Field Schools and Empowerment. Retrieved from http://www.fao.org/3/a-i6343e.pdf.

Dhenge, S., Shrikar, G., Sarap, N., S., 2016. Gender responsive approach to climate smart agriculture. Adv. Life Sci. 23 (5).

FAO and CARE, 2019. Good Practices for Integrating Gender Equality and Women’s Empowerment in Climate-Smart Agriculture Programmes. Atlanta. Retrieved from. http://www.fao.org/3/ca3883en/ca3883en.pdf.

Gauchan, B.J., 2003. A strategy for strengthening participatory technology development in agricultural and natural resources innovations systems. The case of Nepal. Int. J. Technol. Manag. Sustain. Dev. 2 (1), 39–52.

GFRAS, 2011. World Wide Extension Study-Nepal. Retrieved September 13, 2020, from https://www.g-fras.org/en/world-wide-extension-study/asia/southern-asia/314-nepal.html.

Ghaswalla, A.N., 2015. When Women in Rural India Turned Dr Doulittle. The Hindu Business Line. June 30. Retrieved from. https://www.thehindubusinessline.com/news/women-in-rural-india-turned-dr-doulittle/article7370271.ece,

Government of Nepal, 2014. Agriculture Development Strategy (ADS). Ministry of Agriculture Development, Government of Nepal, Kathmandu, Nepal.

Gulati, A., Sharma, P., Samantaraya, A., Terway, P., 2018. Agriculture Extension System in India: Review of Current Status (Trends and the Way Forward).

Gumucio, T., Hansen, J., Huyser, S., van Huyssen, T., 2019. Gender-responsive rural climate services: a review of the literature. Clim. Dev. 1–14. https://doi.org/10.1080/13552074.2019.1613216.

Gupta, S., Kishore, A., Alvi, M., Singh, V., 2020. Designing better input support programs: lessons from zinc subsidies in Andhra Pradesh, India. PLoS One 15 (12). https://doi.org/10.1371/journal.pone.0242161.

Harriss, J., Depenbusch, L., Pal, A.A., Nair, R.M., Ramasamy, S., 2020. Food system disruption: initial livelihood and dietary effects of COVID-19 on vegetable producers in India. Food Secur. 12 (4), 841–851.

ILO, 2017. ILOSTAT Database. International Labour Organization (ILO). Retrieved from. https://data.ilo.org/.

Javed, A., Sadaf, S., Luqman, M., 2006. Rural women’s participation in crop and livestock production activities in Faisalabad-Pakistan. J. Agric. Social Sci. 2 (3), 150–152.

Jawaid, S., Raza, S., 2016. Effects of workers’ remittances and its volatility on economic growth in South Asia. Int. Migr. 54 (2), 50–68.

Jost, C., Kyezze, F., Naib, N., Neelomori, S., Kinyangi, J., Zougmore, R., Aggarwal, P., Bhatta, G., Chaudhury, M., Tapio-Bistrum, M., Nehon, S., Kristjanson, P., 2016. Understanding gender dimensions of agriculture and climate change in smallholder farming communities. Clim. Dev. 8 (2), 133–144.

Karki, B., 2020, April 7. Nepal extends ongoing lockdown to combat COVID-19 – The diplomat. In: The Diplomat. Retrieved from. https://thediplomat.com/2020/04/nepal-extends-ongoing-lockdown-to-combat-covid-19/.
