SOCIO-TECHNICAL INNOVATION BUNDLES FOR ENHANCING WOMEN'S RESILIENCE AND EMPOWERMENT:

A CASE STUDY OF UTTHAN'S INTERVENTIONS IN BHAVNAGAR DISTRICT, GUJARAT

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Socio-Technical Innovation Bundles for Enhancing Women's Resilience and Empowerment: A Case Study of Utthan's Interventions in Bhavnagar District, Gujarat

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1. Introduction

Utthan is a non-profit organization working in the coastal and tribal districts of Bhavnagar, Amreli, Bharuch, Dahod, Panchmahal, and Mahisagar in Gujarat state, focused on empowering small and marginal women farmers. Their unique approach combines sustainable agriculture, gender sensitization, and ensuring women's land rights through interventions that represent Socio-Technical Innovation Bundles (STIBs). The objective of this study is to unpack and understand the combination of technological, technical and other social and behavioral innovations by Utthan that aim to make women farmers resilient and empowered. The primary research questions center around examining the processes of designing and implementing STIBs, studying the effectiveness of these strategies in mitigating structural gender disparities, and assessing their influence on women's resilience and empowerment. Utthan views women as knowledge holders, agents of change, emphasizing on community engagement, adaptive learning, and peer support. Its lead farmer-to-farmer approach enhances knowledge transfer, fostering sustainability. Utthan's holistic model which promotes resilience and gender equity among women farmers facing socio-cultural and economic barriers, was found to be most suitable for this research.

The methodology used to develop the case study is qualitative, incorporating a mix of methods including focus group discussions (FGDs), in-depth interviews, and key informant interviews (KIIs). The research design is influenced by a combination of the feminist social reproduction theory (SRT) and gender-responsive intersectionality frameworks. Social reproduction involves sustaining and supporting human life through caregiving tasks including childcare, and household chores, but also subsistence agriculture and farming, tasks that are predominantly carried out by women. However, this theory recognizes that caregiving activities are often dominated by profit-driven capitalism and patriarchal social relations, leading to a crisis in caregiving and environmental degradation, affecting marginalized populations and women in particular. The gender intersectional approach focuses on social power structures that dominate the use and access to material and non-material resources in agriculture.

The study aims to understand if socio-technical innovations can help in addressing the evolving crisis, especially for women farmers, impacting labor conditions, societal outcomes, environmental factors, and community resilience.

2. Methodology and Sample

This case study was carried out in Hathab and Bhumbhali villages in Bhavnagar district, Gujarat. The villages were selected in consultation with Utthan's team in Ahmedabad and Bhavnagar district, based on where Utthan's STIB interventions were best being carried out. The bundling was a conscious design based on Utthan's past experience in gender and livelihoods and their intersection and was drawn from a strong belief that women's agency building (her voice, leadership, control over resources and bodily autonomy) and technical knowledge, and skill building must go hand in hand. In this case, agency was a key lever in enabling the impactful

use of skills and tools to equitably partake in decision making and actions to transition to sustainable agriculture.

Data collection was done using a qualitative approach involving purposive sampling due to time limitations. The local Utthan team identified *Krushi Sakhis* (KSs), women farmers (WFs) and other key informants with whom in-depth interviews (IDIs) and FGDs were conducted. The IDIs and FGDs developed by the researchers with inputs from ISST and Utthan, were conducted using semi-structured interview schedules, prepared individually for the three categories (Annexures I and II).

Box 1. Respondents of the study.

Women farmers: They work on the farms registered in the name of the husband or in-laws. Utthan engaged 180 women farmers in each village, who are given training in transitioning to sustainable farming.

***Krushi sakhis*:** They are members of the Utthan-incubated local Women's Federation and are lead farmers trained in STIBs approaches. They identify women farmers in their respective villages and enable socio-technical interventions by training and handholding them to enable a shift towards sustainable farming, promote food security, and access land rights. Each village has 2 *krushi sakhis*, each supporting a group of 90 women farmers organized into women farmer groups.

Para-legal workers: Together with *krushi sakhis*, they raise awareness about women's land rights and identify women who can be supported in claiming their rights to land. They are members of the Utthan-incubated local Women's Federation. Each PLW's selection is community-driven. A PLW serves a cluster of 5 villages, hails from the village/local area, and has knowledge of the local area and basic literacy skills to deal with paperwork and complex revenue procedures. PLWs provide socio-legal-psychological support to women farmers, bridging the gap between them and the government system (revenue officials at the village/block/district office), and facilitating easy access to government spaces

IDIs were conducted with KSs, WFs and PLWs and FGDs were conducted first with the KS and

WF to understand the local context and level of Utthan's interventions, followed by a more focused and in-depth interview with the WFs. One of the researchers knew the local language (Gujarati) while the other used an interpreter from Utthan's local office. Four key informants were also interviewed for the case study. Data collection was done in the two sites from 28 November-2 December 2023.

Photo 1. In-depth interview with a farmer from Bhumbhali.

Photo 2. Focus group discussions with women farmers in Hathab.

The following tools were used for the case study:

- **Secondary research analysis** consisted of a **comprehensive review of key program documents shared by Utthan and a desk review of literature on STIBs.** This was done prior to the field work to understand Utthan's program design and intervention, the local context and what STIBs entailed. The review of documents was also used to design the data collection tools.

- **Focus Group Discussions:** FGDs were conducted separately with women farmers and *Krushi Sakhis* to delve into their experiences in sustainable farming, gender-specific challenges faced, and to assess the impact of STIBs on their farming practices and resilience. The questions focused on their attitudes, beliefs, and changes experienced through Utthan's interventions.
- **In-depth interviews with WFs, KSs and Para-Legal Workers (PLWs):** Semi-structured in-depth interviews focused on the following:

    a. Women farmers: Work and asset ownership, unpaid and care work, farming practices and division of labor, decision making related to agriculture and the household, Utthan's interventions in the village, post-intervention changes, and women's understanding of their land rights.

    b. *Krushi sakhis*: Their roles and responsibilities, interactions with PLWs to connect them to women farmers to ensure access to land rights.

    c. Para-legal workers: Their roles and responsibilities, challenges faced, learnings and impact of their work.

- **Key Informant Interviews (KII):** Four KIIs were conducted, one each with a PLW from Mahua block, the Deputy Mamlatdar of Bhavnagar block, Utthan's Area Manager, Coastal Area Programme (the Program Implementer) and the Home Science scientist at

  Krishi Vikas Kendra (KVK), Bhavnagar. The questions focused on their collaboration with Utthan and the impact of their interventions.

Photo 3. A key informant interview in Bhumbhali.

Table 1. The sampling methodology adopted for the study and number of participants.

Research tool	Hathab	Bhumbhali	Other	Total
Focus group discussions with women farmers	**1** (17 participants)	**1** (6 participants)		**2**
Focus group discussions with*krushi sakhis*	**1**			**1**
In-depth interviews with women farmers	**2**	**2**		**4**
In-depth interviews with *Krushi Sakhis*	**2**	**2**		**4**
In-depth interviews with para-legal workers	**1**	**1**		**2**
Key informant interviews		**2**	**2** (in Bhavnagar)	**4**

Verbal consent was sought from all the participants before recording and photographing the interviews and FGDs. Detailed field notes and the recorded interviews were discussed every evening by the researchers. The initial findings were presented to lead researchers at ISST and the team at Utthan during an online analysis workshop for strengthening the analysis prior to writing the case study.

3. Context and Profile

3.1 Utthan: About the Organization

Utthan's journey began in 1981, when four women chose to work in the desolate Bhal region of Gujarat, helping marginalized communities self-organize around critical livelihood issues. It is a grassroots-based institution with a mission to empower women and young girls by providing them with the perspective, resources, and tools they need to amplify their voice, gain access and control over productive resources, entitlements and services, and take control of their bodily autonomy. To create systemic change and drive sustainable impact, Utthan also facilitates partnerships and synergies with various stakeholders and engages in evidence-based advocacy and policy dialogues.

Prioritizing community-based and community-led transformation has been pivotal in building a critical mass of local leaders among women, men and youth. Utthan's practice areas are very much aligned with the Sustainable Development Goals and are demonstrative of grounded and women-led action to address women's human rights issues which are deeply intertwined with issues of security, climate change, biodiversity, water security, resource distribution and governance.

Challenges addressed: Women and young girls face significantly disproportionate challenges due to social, economic, political, and environmental marginalization, their condition is made worse by systems of oppression and discrimination. The impact of poverty, hunger, resource lessness, violence, and climate change on them are most acute, adversely impacting their ability to take decisions at individual, household, community or societal levels. This inequity is perpetuated in society and associated structures. Any consequent development or growth therefore remains inequitable, incomplete, and unsustainable.

Utthan builds their agency at the individual, household, community, and societal levels by enabling control over assets, body, and voice, thereby allowing them to shape their own destinies and providing them the confidence to partake in the creation of a more just and equitable society. Presently, Utthan directly impacts the lives of over 8.5 lakh individuals in six districts of Gujarat and aims to scale this positive influence to at least 25 lakh individuals by 2027.

Utthan has been working with small groups of women farmers on watersheds, sustainable practices, and land rights since 2000, covering indigenous seed augmentation, kharif maize stabilization, promotion of local salt-tolerant and climate-resistant varieties, horticulture farms (vadis), and crab/lobster/prawn cultivation with fisherwomen. In 2018, the program on STIBs was taken up with 5000 women farmers through a systematic bundling of rights and sustainable practices with the support of lead farmers in the villages. Utthan actively focused on large-scale sustainable practices, land rights, MGNREGA, access to schemes, etc., while simultaneously building leadership skills of women farmers and strengthening their identity as farmers and knowledge bearers of sustainable agriculture. In 2021, the program '**Women farmers lead towards food security, sustainable agriculture, claiming women's rights & entitlements**' was strengthened in Bhavnagar, Mahisagar, and Dahod districts under the leadership of 58 KSs (lead women farmers who are mobilizers and on the ground trainers) and Utthan's field team. This case study is based on the program's interventions in Hathab and Bhumbali villages in Bhavnagar district.

Box 2. Scalability of the STIB Approach

Utthan's scalability of the STIB approach involves a twofold strategy: horizontal expansion and vertical deepening. In pursuit of horizontal expansion, it seeks to extend its current participant base of 5000 women to more women farmers in a block, to new blocks, extending beyond the current six blocks, new districts, and even states. Vertical deepening is accomplished by enhancing the skills and capabilities of the women through initiatives such as promoting solar technologies, supporting bio-input production, enhancing other aspects of their livelihood basket, financial and digital literacy, and fostering a comprehensive, sustainable and growth-oriented approach to women's empowerment.

One of the key support systems that Utthan deems important is the establishment of sustainable agricultural enterprises and Bio Input Resource Centers (BRCs), to enable women-led federations to take charge of key aspects of agricultural commerce, including grading, packaging, marketing, and the acquisition of machinery. The goal is to create decentralized hubs at the village level, such as BRCs, which would make bio-inputs available at the village level. The setting up of agri-tool banks (shared pool of agricultural tools and equipment) will help women farmers house and rent drudgery-reducing tools and equipment and larger equipment that small and marginal farmers may not be able to purchase individually. This would encourage the adoption of sustainable agriculture practices, fostering economic independence and self-sufficiency within the communities. The strategic integration of these scalability initiatives aligns with the evolving experiences of KSs over the past two years, enhancing the feasibility of achieving these transformative aspirations.

Utthan is committed to instilling leadership and ownership among women participants, ensuring the continuity of its impact through women-led federations. Its scalability strategy positions the program as a catalyst for holistic empowerment and sustainable development, leaving an enduring legacy in the communities it serves.

At the state policy level, the experience of the STIBs approach provides a promising impetus to better integrate the SDG 2030 Agenda into India's national planning instruments, policies, strategies and financial frameworks. There is global recognition of the need for integrated responses and solutions to deal with multiple crises; the STIB approach will be extremely helpful for governments to develop policies that integrate economic, social, and environmental dimensions of sustainable development.

3.2. Profile of the Study Sites

3.2.1. Hathab

Hathab is the largest village in Bhavnagar district in terms of population (approximately 1277 households, as per the 2011 census, most of them nuclear families). The village consists mainly of small and marginal farmers from the Koli community (OBC). The primary means of livelihood is agriculture, diamond cutting, agricultural and construction labor, and animal husbandry (around 2-3 cows/ buffaloes per household). Being a coastal village, soil and water salinity pose the biggest challenge. Women in the village engage in farm and allied work whereas the men mostly migrate to diamond-cutting factories or work as wage labor on construction sites at Bhavnagar. Daily migration even during the crop season is common due to small land parcels and the scarcity of water for agriculture.

Farmers engage in agricultural activities mostly during the kharif season which lasts from mid-June to September, during which they grow pearl millet (bajra) and sapodilla (chikoo).

Photo 4. In-depth interview with a farmer in Hathab.

Socio-economic Profile of the Women Farmers

The average age of the women farmers (n=192) is 41.3 years, with the minimum age being 22 years and the maximum 70 years. About 99% of them are primarily engaged on the family land and 1% are home-based workers. The average size of the land they own is 0.66 acres, the minimum being 0.2 acres and the maximum 2.8 acres. Of the women farmers, 57.3% are illiterate, 36% have completed primary schooling, 5.2% have completed secondary schooling, 1.5% have completed higher secondary, and none are graduates. Of the women farmers, 14% are widows, 99.5% have Aadhaar cards, 40.6% have job cards, 99% of them have bank accounts, and 52.6% have Ayushman cards (Table 2). None are members of the village SHGs but most of them are members of Utthan-incubated sanghathans (federations).

Table 2. Socio-economic profile of the women farmers (n=192) in Hathab.

Categories	Women farmers (%)
Household heads	24.5%
Aadhaar card[1]	99.5%

[1] Aadhaar is a 12-digit individual identification number available to all Indian residents voluntarily, based on biometrics. It aims to eliminate duplicate and fake identities, offering easy online verification an

MGNREGA Job card[2]	40.6%
Bank account	99%
Ayushman card[3]	52.6%
Women with land in their name	14.1%
Growing crops only in kharif	61.9%
Fully rain dependent	57.8%
Members of government SHGs	0%

Source: Baseline survey by Utthan, 2022.

3.2.2. Bhumbhali

Bhumbhali mainly has medium to big farmers. Kharag Patel (OBC) is the dominant caste in the village. The primary sources of livelihood are agriculture, animal husbandry, and construction labor. Being a coastal village, the high salinity in groundwater makes it non-usable for irrigation purposes; hence farmers can produce crops only in the kharif season. Land parcels in Hathab are larger than those in Bhumbhali, where farmlands are 2-3 km away from residential areas.

The transition to sustainable farming in Hathab was easy because of the small land parcels, leading to lower input costs, as a majority of their produce is for self-consumption, compared to the transition in Bhumbhali that took longer because of the larger land parcels and cash crop grown by the farmers.

Socio-economic Profile of the Women Farmers

The average age of women farmers (n=200) is 43 years, with 20 years being the minimum age and 75 being the maximum. The primary occupation of around 11% of them is agricultural wage labor while the rest work on the family farm. The average size of land parcel owned is 2 acres, with 0.5 acres being the minimum and 6 acres being the maximum. Of the women, 55% are illiterate, 6.5% can read and write, 32% have completed primary schooling, 4% have completed secondary schooling, 1% completed higher secondary, and only 1.5% are graduates. Widows comprise 10.5% of this group. The socio-economic profile of the women farmers is given in Table 3.

Table 3. Socio-economic profile of the women farmers (n=200) in Bhumbhali.

[2]Job card is a key document that records workers' entitlements under MGNREGA. It legally empowers the registered households to apply for work, ensures transparency, and protects workers against fraud.

[3] The national health authority issues the Ayushman card, which offers access to a network of public and private hospitals across India for people belong to the EWS category, lower income category, and those without permanent residence are eligible to apply for this scheme.

Categories	Women farmers (%)
Household heads	6%
Aadhaar card	100%
Job card	35.5%
Bank account	98.5%
Ayushman card	36%
Women with land in their name	9%
Growing crops only in kharif	67.5%
Fully rain dependent	61.5%
Members of government SHGs	7%

Source: Baseline survey by Utthan, 2022.

3.3. Socio-Technical Innovation Bundles (STIBs)

Socio-Technical Innovation Bundles are mechanisms by which social, technical, and technological methods are explored, identified, developed, bundled, and implemented to mitigate challenges in agriculture affected by climate change to enhance climate resilience among women farmers with no social security and access to resources.

Utthan's 13 Package of Practices (PoPs) were defined by combining the local knowledge of women farmers and the Utthan team, with the scientific practices defined by agricultural universities (Table 4). While Utthan considers all of them important for a transition, only 8 POPs are defined as compulsory for the transition. These together with perspective sessions on the identity of women as farmers, their crucial role in agriculture, importance of land ownership, and strategies to facilitate household decision-making, have been put together in a manual, which the KSs are trained to use along with various aids. This knowledge is then disseminated to WFs using flipcharts, games, discussions, and field demonstrations.

The peer-to-peer learning model, the strategic positioning of PLWs and facilitating WFs to become members of the Women's Federations are the social interventions, coupled with technical knowledge (soil testing, making organic fertilizer, seed treatment, sowing techniques) and technological assistance (tools to pick vegetables, mulching, drip irrigation) that comprise the STIBs for WFs to shift towards sustainable farming, adopt practices that promote climate resilience and empower them.

4.Thematic Areas of the STIBs

4.1. Utthan's 13 Package of Practices (PoPs) – Technical Inputs

The package of 13 sustainable farming practices (Table 4), derived from the scientific module used by the agriculture universities of Gujarat, underwent modifications based on practical insights from the Utthan team and the farmers collaborating with Utthan. For example, the university module advocated the preparation and addition of jeevamrut [4] while local farmers recommended enhancing its quality by incorporating buttermilk. Similarly, the prescribed seasonal and seed recommendations from the university were adjusted to the farmers' experiential wisdom, such as favoring local seed varieties of maize instead of the 555 variety. Agricultural experts were consulted in formulating these practices, with the overarching goal of augmenting production, reducing costs, and enhancing income, particularly focusing on staple food crops in the coastal region of Gujarat.

Eight practices were designated as compulsory for a transition to sustainable agriculture, such as the use of organic fertilizer Jeevamrut and adopting line sowing to save 2 kg additional seed/ acre resulting in cost reduction. An increase in production is expected only after two years of consistent adherence to these practices, justifying their mandatory status.

Table 4. Utthan's Package of Practices to enable a shift towards sustainable agriculture.

S. no.	Package of Practices	Compulsory POPs	Utthan's Perspective
1.	Soil and water testing		Soil testing is done to identify nutrient deficiencies and recommend appropriate additions, such as organic matter or gypsum, to improve soil fertility, structure and water-holding capacity. Water testing in coastal regions helps gauge salinity level, facilitating well-informed decisions aimed at optimizing crop production.
2.	Use of farmyard manure	✓	This ensures effective land preparation by selecting the right tilling method, using organic manure or compost (FYM), determining optimal quantities of manure, and implementing soil levelling practices. Avoid the use of Diammonium Phosphate (DAP) in land preparation.

[4] Jeevamrut is an organic fertilizer made of cow dung, cow urine, water, jaggery, and gram flour. It acts as a bio-stimulant by promoting the activity of microorganisms and also increases the population of native earthworms. Beejamrut is a fermented microbial solution applied as a seed treatment. It is effective in protecting young roots from fungus and helps in the healthy growth of plants.

3.	Selecting better quality of seed	✔	This involves the use of Certified/improved variety/locally available traditional seed and avoiding hybrid seeds.
4.	Seed treatment with culture	✔	This involves the adoption of organic crop-specific seed treatment, such as Beejamrut and Trichoderma.
5.	Sowing method	✔	Line sowing leads to better germination, reduces seed requirements, and facilitates intercultural operation.
6.	Mixed cropping	✔	This improves soil health, optimizes resource use, and enhances resilience to pests and diseases.
7.	Mulching		Mulching aids in conserving water, temperature regulation, weed suppression, preventing soil erosion, and improving soil structure.
8.	Interculture and weeding	✔	This involves regular monitoring, timely and mechanical weeding, and timely interculture to enhance nutrient availability, water conservation, and crop yield.
9.	Crop protection through organic pesticides	✔	Crop protection through the production and use of organic pesticides for specific diseases/crops (Dashparni, Neemastra, Agniastra), and the use of trap crops, pheromone traps, etc.
10.	Use of organic manure for plant growth	✔	Use of organic manure (Jeevamrut) by providing guidance on application time, frequency, and quantity.
11.	Proper time to harvest		Promote timely harvesting based on days to maturity, maturity indicators; adoption of various harvesting methods; and promoting the use of automated reaper instead of manual harvesting.
12.	Cleaning and grading of seed		Proper cleaning and grading of seed (those not cross pollinated and for sale of surplus in the market).
13.	Method of storage		Revival and documentation of traditional methods (no chemical, use of herbs/plants).

4.2. Technical Innovations - Training

Training is an essential technical tool used by Utthan's team to share and exchange knowledge and strengthen leaders and institutions to enable collective prioritization and planning.

4.2.1. Capacity Building of KSs

To lead the grassroots movement towards sustainable agriculture, KS were imparted on-farm and off-farm training for approximately 20 days, aimed at enhancing their understanding of scientific and sustainable PoPs, developing a gendered perspective of agriculture, and nurturing women's leadership. They also underwent training to cultivate leadership skills to secure a rightful space, voice, and identity, develop strategies for equitable work distribution and were exposed to the best practices through visits to agriculture universities and successful government/non-government initiatives. To equip them for their roles and enhance their skills in training delivery, they also underwent a Training of Trainers (TOT).

4.2.2. Knowledge Transfer by KSs to WFs

The knowledge transfer by KSs to small and marginal women farmers is done through continuous training in all the seasons, crop wise. *Krushi Sakhis* provide on-farm training to demonstrate the production of bio-pesticides and fertilizers. Along with scientific agricultural approaches, they emphasize the significance of traditional seeds and advocate for food and nutritional security. This knowledge is disseminated through flipcharts, posters, videos, films, etc. The training module also consists of various methods of teaching and learning through audio-visual stimulation, developed by Utthan in collaboration/consultation with subject matter experts. In the trainings, WFs also sing songs related to farming, fostering a sense of solidarity and sisterhood among the participants. KSs show visually appealing videos and documentaries on tablets provided by Utthan (each tablet is shared by 2 KSs) on topics such as the importance of earthworms for soil health, the impact of urea usage in agriculture, using vermicompost rather than urea, and how to make Jeevamrut (manure), and Beejamrut (organic substance for seed treatment).

Creative and culturally sensitive skits are used to raise awareness on sustainable agricultural practices, women's identity as farmers, and women's land rights to reach a larger community within the village.

Box 3. Krushi sakhis' tools to disseminate knowledge to women farmers

Krushi Sakhis employ visual aids to communicate their ideas to women farmers. These include two plates (one green and one red). On the red plate, they place fake currency notes representing the cost per item in chemical farming, such as expenses on chemical fertilizers, insecticides, visits to agro-centers, etc. On the green plate, they arrange notes indicating the expenses involved in sustainable farming, such as Jeevamrut and Beejamrut. They ask the women farmers questions like, "How much do you spend on urea?" which results in an active discussion among the women. This activity raises their awareness about the stark contrast between the high cost of chemical farming and the comparatively lower expenses in sustainable farming. This method is particularly effective as many of the women are

illiterate; moreover, using tangible currency notes provides a clear way for them to understand the financial difference between the two approaches of farming.

In another activity, women are asked to hold up a chain (or something similar). Using this symbolic chain, they emphasize the importance of women holding each other's hands and standing united. The message conveyed is that women must act as peers, learning from one another, and providing mutual support, a collaborative effort that can help them rise to greater heights both individually and collectively.

Photo 5: Tools (chain, stick, red and green plates and currency notes) used by Krushi Sakhis to train women farmers.

4.3. Social Interventions

The social interventions by Utthan included enabling peer-to-peer learning, training by KSs, and PLWs aiding and enhancing women farmers' understanding of land rights.

4.3.1. Peer-to-Peer Learning Model

The peer-to-peer learning model had its origin in Utthan's facilitation of forming of Water Committees wherein women and men leaders were supported in building their social, technical, leadership and communication skills to sensitize others. .

Utthan's shift to integrating women's land and property rights into their work emerged during a land rights workshop in 2002, followed by co-founding the Working Group of Women & Land Ownership (2003), facilitating land rights realization directly through a cadre of para-legal women leaders (2006-07). The movement evolved into a people's initiative, addressing concerns raised by women during public hearings on industrial projects impacting common and private lands. This happened at a time when the conversation was around how to follow up on women's involvement in agri operations, their knowledge in agriculture, access and control

over resources, and scope to apply sustainable agriculture techniques to increase earnings from agriculture. In 2018, Utthan compiled insights from women farmers, its past experiences, agriculture experts, and the Indian Council of Agricultural Research (ICAR) network's institutional knowledge to develop tools that prioritized a gender perspective rather than solely focusing on technical aspects. **Utthan was clear that any technical skill transfer or livelihood enhancement should be accompanied by building the agency of women farmers and gender sensitization at the community level.**

The emphasis on prioritizing hand-holding support for farmers in the first 3-4 years emphasized the significance of commencing sustainable farming on a small portion of the landholding and then gradually transitioning to larger plots. The program's expansion in 2021 reflected a holistic approach, delving deeply into addressing important issues such as food security, land rights, women's identity as farmer, sustainable farming techniques, and leveraging government resources, entitlements, and schemes. Utthan's progression leading to the introduction of the KS concept in 2021 highlighted the dynamic and evolving nature of the program.

Central to the success of these initiatives is the peer-to-peer learning model. Women leaders played a pivotal role in facilitating change, with PLWs and KSs assuming active leadership roles. Through this model, women were not only recipients of knowledge but also contributors, creating a sustainable framework for the dissemination of STIBs and fostering a collective environment where women empower each other. The transfer of knowledge from Utthan team to KSs too, played a foundational role in success of the transfer from KS to WF.

The peer-to-peer learning model of Utthan is a social intervention to build community agency through participatory communication, build awareness and transfer skills in sustainable farming.

The existing mahila mandals[5] of the Federations and outreach through Utthan's field team led to the mobilization of interested farmers based on a set of indicators including land holding, socio-economic marginalisation, income levels etc. In the 2018-21 phase, Utthan took on farm demonstrations.

The trust built as a result served as an entry point to expand the work. When women observe that their neighbour has realized a favorable price for her crops, curiosity sparks a conversation. She then enquires about methods employed. This interaction becomes the catalyst for spreading awareness about the benefits and techniques of sustainable farming.

[5] Mahila mandals are village-level groups created by Utthan under Federations incubated by it for the collectivization and empowerment of marginalized women.

Photo 6. Hansaben with the certificate of recognition she received for Sustainable Farming Practices from ATMA, Krushi University at Anand and Gujarat Organic Products Certification Agency (GOPCA).

One of the KSs explained how Utthan would not have been able to directly reach 90 women in each village in a year without *Krushi Sakhis* who belong to the same community, aiding trust and rapport building. She stated that in the initial five to six months, there were only 5 women with her, which subsequently increased to 90. The 5 women would spread the word to other women farmers, who seeing the results on the farm, would be motivated to join them.

Moreover, all the KSs possess tablets provided by Utthan, which they use for data entry, taking pictures, and showing videos to WFs, contributing to their digital literacy and empowering them by reducing their dependence on others.

4.3.2. Role of Krushi Sakhis

Utthan has adopted a structured participatory process to engage krushi sakhis. Women Master trainers (MT) who have been trained by Utthan and other competent and enthusiastic women farmers were called to a meeting during this process. Women farmers from each village were provisionally selected as *Krushi Sakhis* based on their attitude, expertise, and capacity for helping others during the women farmer meetings. These women were then evaluated on how they were able to adopt 13 agricultural POPs in the previous kharif season. Each POP adopted was scored as 1, and each individual woman farmer's score was computed against the maximum score of 15, thereby ensuring the selection of only those who had adopted the POPs at the household level. Each woman's score was plotted and shared with the Utthan field team to assess their strengths and weaknesses for each POP.

Photo 7. In-depth interview with krushi sakhis, Hathab.

Each village has 2 krushi sakhis, each managing 90 WFs who have been part of the sustainable agriculture program since 2018-2021 (phase I). They engaged with Utthan through Mahila mandals at the village level which are part of the Federation. Those not part of Mahila mandals joined the initiative due to their interest in sustainable agriculture and the mobilization efforts of Utthan's team and women leaders. Utthan's team members undertake a monthly review and planning meeting with all the KS who report on the progress made, challenges encountered and develop monthly plans.

The role of *Krushi Sakhis* is to facilitate community mobilization, provide agricultural training, ensure access to resources, and advocate for the rights of women in agriculture as well as help the women farmers gain access to government schemes such as Ayushman card, widow pension, Kisan credit card, etc. They also act as via media between WFs and PLWs.

4.3.3. Role of Para-legal Workers (PLWs)

As per the annual Periodic Labour Force Survey (PLFS) Report 2021-22, agriculture had the highest estimated distribution of female workers in India, i.e., 62.9 %. However, social norms embedded in deep-rooted patriarchy restrict women from owning land. Para-legal workers intervene to ensure that women farmers are not just workers on the farms but that they also have access to land rights and exercise their agency in decision-making in farm-related activities, by raising awareness about their land rights and cultivating in them a strong sense of identity as farmers.

The selection of PLWs is made based on recommendations from members of the sanghathan (federation) based on their interest and commitment, capability, past record, local knowledge, cultural understanding and drive for socio-legal transformation in the villages. Each PLW is

assigned five villages and connects with *Krushi Sakhis* from the same village, who in turn introduce them to women farmers during their trainings to take up legal literacy and facilitate land rights realization.

Sometimes, the PLWs are women who have either survived domestic violence or have shown exemplary resilience while facing challenges in their lives. Sharing their lived experiences with the WFs builds trust and confidence. The PLWs also connect the women farmers to the Nyay Samiti (Justice Committees) of the Utthan-incubated Women's Federations, where they can report instances of domestic violence, partner violence, violence against widowed farmers for demanding land rights, etc., to seek socio-legal counselling and support.

> "Now men tell me that they want to register land in the name of the wife. Earlier, men from the Rajput Darbar would not let us enter the village and would threaten to beat us if we did. The situation has improved because of greater awareness. Now Darbar women have begun coming to meetings, unlike before. There's still a long way to go.
>
> **- Gavuben Chudasma, PLW, Samarthan Mahila Sanghathan**

The PLWs have a Swa Bhoomi Kendra (SBK) at the office of the Mamlatdar (Land Revenue Officer) at the Block level that serves as a bridge between women farmers and the government system. While the constant transfer of Revenue Officers poses a challenge to the PLW in terms of building rapport and explaining their work to the incoming officer, the Deputy Mamlatdar at the Bhavnagar block noted that the PLWs are like extended arms of the system. There was an instance of a PLW's work leading to a Mamlatdar requesting a PLW to institutionalize a Swa Bhoomi Kendra in the next block where he was being posted next.

Photo 8. Pare-legal worker Gauben at her Swa Bhoomi Kendra desk at the Block Office, Bhavnagar.

> “ Now, we inform the Mamlatdar about the GRs (guaranteed rules) and tell them about various land laws, sometimes.

- Gavuben Chudasma, PLW

4.4. Climate Change

Climate change has major implications for food security and the livelihood of small farmers. Women farmers in Bhumbhali mentioned that they had been farming since they were young girls and had observed changes in the climate and its impact on agriculture. Since most of the farmers are dependent on rain for good yields, anything more or less than the seasonal amount of required precipitation causes crop damage. The river that was perennial for 12 months earlier has dried up now, resulting in no water in the canals.

For instance, in June 2023, unending heavy rainfall for 32 days washed out jowar and bajra crops, necessitating a second sowing. However, a subsequent 40-day dry spell hindered crop growth. Late sowing due to rains also affected many crops while the subsequent lack of rain impacted their development. The heavy rains caused groundnut crops to shrink and wither. Those who had also sown pulses saw the crop being washed away, forcing them to rely on the market where it is expensive. Moreover, families prefer traditional green gram as they find hybrid green gram lacking in the desired mithaas (flavoursome). The prolonged absence of

rain prevented the use of Jeevamrut on farms, as it requires a slightly wet environment and needs to be mixed in damp soil.

> If our crops fail due to drought and we have to rely on the market to purchase food, we prefer not to buy items like pulses, even though they are a source of nutrition, because they are expensive.

- Lalitaben Baraiya, woman farmer, FGD, Hathab

> We love khichdi made from traditional mung bean rather than the one made using hybrid seeds, which is tasteless. There is a clear difference in taste. Khichdi made from traditional seeds is very flavoursome and satisfying.

- Shantuben Baraiya, woman farmer, FGD, Hathab

Some women farmers mentioned that vegetables rot due to unexpected rains that have become very frequent lately. Also, when it is cloudy and rainy and plants do not get sufficient sunlight, crop damage occurs.

Additionally, erratic rainfall is likely to impact drinking water availability. The declining water levels in wells pose a threat to the upcoming rabi crop, as people sow less, in turn reducing agricultural activities and the availability of farm labor jobs; so, individuals have to depend on labour-intensive, low-paying MGNREGA[6] jobs for which they may not be paid. In certain cases, labour is compensated not only with wages but also harvested produce, such as onions, other vegetables, or fruits.

Moreover, being a coastal area, the salinity of water and land are high and negatively. The WFs mentioned that if it rains in July, water in the well is sweet but by January-February it starts becoming saline again. It affects cooking as dal (lentil) does not cook well, changing the taste of food. When production is affected by high salinity, it affects the crops to be grown in the next

[6] Mahatma Gandhi National Rural Employment Guarantee Act 2005 (MGNREGA) is a government act that aims to enhance livelihood security in rural areas by providing at least 100 days of wage employment in a financial year to at least one member of every household whose adult member volunteers to do unskilled manual work. Women are guaranteed a third of the jobs made available under MGNREGA.

season as well. The women farmers complained of more storms and untimely ones than before that damaged crop.

The presence of a lignite factory near the village has contributed to water salinity in the last 15 years. The carbon emitted by factories resulted in poor soil health. The extensive felling of trees and the release of heavy chemicals by factories have heightened pollution levels, creating uncertainty in rainfall patterns. This imbalance adversely impacts crops, diminishing their quality and escalating maintenance expenses, leading to increased reliance on the market for self-consumption.

Besides, the effects of climate change are not limited to human life alone; crop failure leads to fodder shortage for livestock. A poor monsoon exacerbates water shortage for animals; this makes maintaining livestock expensive.

4.4.1. Increased Burden of Unpaid Labor

The effect of climate change is gendered. It disproportionately increases the burden of unpaid labor on women farmers who clear debris from fallen branches or damaged crops after heavy rains and fetch water from wells when water pumps become dysfunctional during power cuts. This reflects the social reproduction theory's (SRT) assertion that care work is often overlooked and undervalued, particularly when linked to environmental challenges. Rains also accentuate the cooking burden on women since firewood and sticks get damp, forcing them to cook on a gas stove rather than earthen chulhas that they prefer and on which the quantity of food that can be prepared is greater. If their harvest is affected by heavy rains, they further lose out on income, forcing men of the household to migrate for work, thereby perpetuating the vicious cycle of unpaid labor.

4.4.2. Impact on Men's Wage Work

Limited land size, water scarcity, salinity, erratic rainfall, and increased frequency of extreme weather events in Bhavnagar have resulted in men migrating to nearby blocks/ cities for daily labor while women stay at home to take care of the family and farm activities. This scenario aligns with the SRT which posits that care work disproportionately falls on women. Women bear the burden of preparing meals and handling additional chores to support the male labor force engaged in physically demanding jobs like construction and shipbreaking.

When men have to travel longer distances to find paid work, women not only manage existing responsibilities but also take on extra tasks, resulting in a 'crisis of care', as described by Fraser (2017)[7] and emphasizing how the hierarchy in economic paradigms biases resource allocation towards market production, thereby straining the social-reproductive responsibilities primarily

[7] Fraser, N. (2017). Crisis of care? On the social-reproductive contradictions of contemporary capitalism. In T. Bhattacharya (Ed.), Social Reproduction Theory (pp. 21–36). Pluto Press.

shouldered by women. The study resonates with Floro's (2012)[8] insight that environmental challenges are intertwined with social reproduction crises, leading to an overburdening of women in cases like Bhavnagar. SRT's emphasis on understanding agriculture not only as a production process but also as a social and cultural system deeply connected to the reproduction of individuals and societies contributes to an enhanced understanding of gendered implications of climate-induced migration within the broader context of social reproduction and intersectionality.

> “ In a bad monsoon season, our husbands go to construction sites. When they return, they are completely unrecognizable, covered in dust and cement. Washing their clothes becomes exhausting; our hands hurt from so much washing, not to mention the soap costs that go up as well.

- Jasumati Ben, krushi sakhi, FGD, Hathab

> “ Earlier, my husband used to help me cut vegetables for dinner. But if he has to go out of the village for work, he comes back so tired that he doesn’t help me. Instead, I have to do additional duties to take care of him.

- Labhuben Baraiya, krushi sakhi, FGD, Hathab

[8] Floro, M. S. (2012). The crises of environment and social reproduction: Understanding their linkages (p. 13). Department of Economics.

4.5. Utthan's STIB Model – What Worked, What Did Not, and Tactics Adopted to Overcome Challenges

4.5.1. Interventions Adopted on Farms by WFs

- **Soil testing:** Earlier, farmers avoided undertaking soil tests due to a lack of knowledge, limited understanding of its significance, inadequate guidance on interpreting results, and information delivery delays. Many WFs collected soil samples themselves and sent it for testing. They have a better understanding of salinity, nutrient (nitrogen, phosphorus, potassium) levels in the soil, enabling informed decisions on the use of organic fertilizers. Thirty soil samples were collected from each village for soil testing.
- **Crop selection in line with soil type: WFs** have acquired knowledge on crops suited to different soil types. They can now distinguish between various soil types, such as kaali (black), madhyam kaali (medium black), retaal (sandy), and goralu (white), enabling them to assess soil conditions and strategically choose crops that are well-suited to the specific soil type.
- **Organic fertilizer/ Farmyard manure/ compost:** Women farmers have adopted a systematic and scientific method of digging measured pits and adding specific elements to it in place of the conventional method (creating unregulated compost heaps in open spaces). This has improved the quality of compost, increased nutrient content, enhanced soil health, and saved costs.
- **Tilling technique:** Previously, women farmers lacked the technical knowledge to determine the right tilling depth for different crops. However, with new knowledge, they now comprehend the specific requirements for each crop. For instance, they recognize that peanuts benefit from deep tilling, whereas millet requires less invasive tillage. This has averted crop damage, led to increased production, improved crop quality, and resolved previous issues related to crop drying.
- **Mixed cropping:** With training in mixed cropping, women farmers have adopted it on their farms and now understand that pairing crops symbiotically provides nutritional benefits, optimizes land use, boosts agricultural productivity and is a more efficient and sustainable use of resources. For instance, they grow bajra for sale and mung for consumption. They also grow pulses for their own consumption.
- **Less dependence on chemical inputs:** WFs have recognized that crops treated with chemical insecticides and pesticides are dangerous for insects, plants, livestock, and human health. They have observed a rise in the occurrence of cancer and diabetes due to the use of chemicals in farming, making them to shift to natural, homemade, and cost-effective alternatives like Jeevamrut (organic manure).
- The motivation to adopt sustainable agricultural practices comes from a desire to consume organic food, improve soil health, and enhance personal well-being. WFs are motivated to share their learnings from KS with other farmers. They firmly believe that sustainable farming offers benefits such as improved life expectancy, health for future generations, and inspiration for others to follow suit.

- Women farmers stated that the use of chemicals by one farmer may contaminate adjacent farms. Hence educating other women farmers about the benefits of sustainable practices is crucial. They felt that excessive application of chemical fertilizers over time has led to soil hardening, lack of organic matter, and less beneficial microorganisms in the soil. Soil structure has improved and earthworms are back after adopting sustainable agricultural practices.

> “During the training, I realized the crucial role of land selection. For instance, crops like bajra require a specific type of land. Previously, we would plant it where peanuts were grown the previous year. Now we understand the importance of choosing the right land for each crop.

- Labhuben Baraiya, krushi sakhi

4.5.2. Impact of the Interventions on Farming

This section reports on instances of interventions leading to positive changes, improved agricultural productivity, economic empowerment of women, and a shift towards environmentally friendly and sustainable farming methods.

- **Diverse positive impacts:** The WFs and KSs stated there were various positive impacts on their farms since adopting sustainable farming practices, such as a reduction in weeding, water saving through drip irrigation, and a decrease in labor needed on farms.
- **Creeper method:** A woman farmer stated that training in the creeper method of growing vegetables, supported by materials provided by Utthan, had improved the quality of vegetables grown and also inspired others in the community to adopt the same.
- **Seed treatment and selection:** The technical inputs on seed treatment and selection have been beneficial in protecting plants from pests and diseases. Organic seed treatment has led to better crop growth, preventing rotting or fungal infections.
- **Improved farming practices:** Practices such as line sowing has made it easier for WFs to remove weeds efficiently, reducing the time spent on this task. The softer texture of the soil also contributes to easier plowing and an overall reduction in farming costs.
- **Crop diversity and resilience:** The use of Beejamrut and Jeevamrut, along with the adoption of specific seed varieties like Samruddhi bajra have resulted in fewer crop failures, increased resilience to environmental factors and consequently better yields and increased profitability.

- **Knowledge transformation:** Women farmers who worked independently prior to the intervention now actively seek advice from KSs on crop selection, seasonal planting, nutrient quantities in Jeevamrut, new seed varieties, innovative cultivation techniques, and the importance of restoring soil nutrients through crop rotation.
- **Income increase and mindset shift:** Women's incomes have increased, and they are now viewed as agents of socio-economic change within their households. There has also been a shift from income-oriented farming to prioritizing food security and opting for home-grown organic produce.
- **Contributions to decision-making:** Women now actively contribute to farm-related decision-making, indicating an empowerment and greater involvement in shaping the direction of their agricultural activities.

> “ Earlier, men would dismiss our inputs, saying, ‘you don’t understand. I'm getting urea today, and we'll use that.’ However, after excessive use of urea led to soil hardening, they acknowledged that we were right.

- Krushi sakhi, FGDs in Hathab

4.5.3. Impact outside the farm

The impact of Utthan’s interventions has been visible in their personal lives as well. The women farmers stated that their financial literacy had improved and greater savings had been possible through reduction in cost of production. Their overall health had improved because of eating naturally grown food, such as the bajra that they grow that has more Zinc content that is beneficial to women during pregnancy. The women also mentioned that they have started shifting their focus from wage labor to working on their own farms. A woman mentioned that her brother had started working on his own farm rather than engaging in diamond cutting which pays less. The positive impact on their farms has motivated other women farmers to get connected with Utthan, thereby, facilitating the peer-to-peer learning model.

> I and my husband, once a diamond cutter, decided to transition to farming to cultivate vegetables. Persuading him to join me in this venture proved successful, and the shift has significantly improved our financial situation. Unlike the limited benefits we derived from the diamond industry, our farm not only provides sustenance but also allows us to accumulate savings. With the combined efforts of my husband, our child, and myself, we are now engaged in agricultural activities, cultivating the land and enjoying the fruits of our labor.

- Shilpaben Dhapa, woman farmer

> A woman farmer's husband was a vegetable vendor who would buy from the agricultural market at wholesale prices and sell them in Bhavnagar market. Now he’s a full-time farmer who grows drumstick and brinjal. Even if we can help a couple of people like this, it's a significant change in their lives.

- Labhuben Baraiya, Krushi Sakhi

Men in the households have begun supporting women in agriculture-related activities after observing the higher productivity and market value of the produce. Moreover, there are fewer instances of domestic violence as a result of women’s association with PLWs, their collective power and social positioning. Men are wary that no instance of violence will be tolerated and that the women will approach the Nyay Samiti for justice, which will cause the men problems.

> Before coming to this interview, my husband told me, 'Don't worry about the household chores or the farm work. Focus on your meeting.' Even though there were labor on our farm handling the harvest, he assured me that I should prioritize the meeting without any concerns.

- Lilaben, Krushi Sakhi, FGD

Owing to awareness generation by PLWs and the KSs, access to schemes like Pradhan Mantri Kisan Samman Nidhi (PM-KISAN), support for farming equipment has improved. Many households have registered under the schemes.

The interventions have seen a growing recognition of and respect for KSs whose training of 90 women has contributed significantly to their prestige in the community. *Krushi Sakhis* also attend meetings of the Village Development Committee (VDC) set up by Utthan to plan and implement development activities within a village, where they present their work on sustainable agriculture and discuss issues related to village development. Greater participation of women in these meetings was observed, where they share their concerns and viewpoints. The committee consists of members from the Panchayat, social leaders of the village, educationists, PLWs, KSs, and WFs.

Asked to share an example of increased independence, one woman farmer said she could now independently arrange her son's marriage with a bride of her choice. This raises a broader question: Does this newfound agency empower women to respect and honour choices made by others?

They are actively involved in decision-making on farms, a shift from when such matters were solely determined by the in-laws. Women are now actively building connections with the larger community, assisting each other, visiting each other's farms, and participating in meetings and other activities outside their homes. The KSs have experienced increased mobility, gained more freedom to venture outside their homes, even travelling alone to Ahmedabad. Earlier they would only be able to go to Bhavnagar with the menfolk.

4.5.4 Improved decision making within the family and community

The interventions have impacted women farmers' decision-making ability, and they are now valued as 'agents of change' within their households and the larger community, aided by Utthan's training that gives them a technical edge over the men. Prior to this, men in the household dismissed women's opinions on farm-related matters and questioned their knowledge. In the initial stages of training, they had reservations about women attending meetings or their purpose. Older women (mothers-in-law) resisted any move by the women to attend meetings, but have slowly accepted the benefits that have accrued. Women farmers stated that now they have support from their family, the community as well as the Panchayat.

> In the past, men used to question women about their knowledge of organic farming, expressing concerns about potential insect damage during the early stages of intervention. They would bring pesticides from agriculture stores. Nowadays, the scenario has changed, and men are seeking our advice on when to start preparing Jeevamrut.

- Kundanben Dhapa, Krushi Sakhi

> Previously, men had strong egos, undervaluing the work of women and dismissing their importance. The perception was that men, by going outside and procuring goods from the market, held a higher status, while women were marginalized. A transformation has occurred; men now recognize the worth of women. Initially, there was little support, with men reacting negatively when women mentioned work or training. Despite this resistance, women persisted. In the past, decisions were dictated solely by men on the farms, but now there has been a shift. We engage in discussions, deliberate on everything, and consider the mutual benefits of our actions.

- Kundanben

> My mother-in-law would say that I have too many meetings. When she accompanied me to them twice, she realized that they were important and provide valuable learning. Today, when I called you here for the interview, she guided me to sit comfortably in the backyard for the interview.

- Labhuben Baraiya, Krushi Sakhi

One of the WFs also mentioned that along with a shift in decision making, there has also been a shift towards equal access to farm income.

> Income from the farm is kept in a place accessible to both of us to use anytime. If any of us takes some money from the repository, we inform the other. This way, both of us move ahead together.

- Shilpaben Dhapa, woman farmer, in-depth interview

As men involve themselves in agricultural activities, women are relieved from early morning chores in preparing for the husband's departure for wage work and have free time for rest and leisure. The shift in responsibilities has resulted in husbands assisting in household chores, unlike when working at the diamond factory necessitated early departures in the morning and late return, leaving them fatigued and disinclined to contribute to household tasks. Presently, both partners can manage their agricultural duties collaboratively, fostering shared responsibilities and allowing them to spend quality time together.

5. Challenges and Lessons Learnt

Embarking on this initiative 1.5-2 years ago, the project faced initial hurdles in achieving widespread participation due to geographical dispersion. To counter this, KS initiated hamlet-wise meetings, ensuring smaller, more accessible groups. Initially, women were reluctant to test the soil, primarily due to the associated cost of Rs. 150. Overcoming this barrier required persistent encouragement and explanations from KSs. The scheduling of meetings posed another challenge, as some women were uncomfortable with the morning timings that matched the availability of women facilitators. House-to-house invitations by KSs precede each meeting.

Significantly, overcoming gender norms related to mobility and low participation in decision-making processes was an ongoing challenge. Women's caregiving responsibilities, aligning with traditional roles, were addressed by their ability to bring children to meetings, ensuring their regular participation.

PLWs encountered hurdles stemming from their restricted literacy and limited familiarity with intricate revenue-related matters. While PLWs possess fundamental knowledge on widow rights and land distribution, rules governing feedback, stamp duties, affidavits, and document registration are formidable. The transition to online platforms further accentuated the need for comprehensive training, particularly in identifying diverse documents required (birth certificate and Aadhaar card), understanding case nuances, and comprehending the myriad processes associated with distinct categories of cases. Temporal delays in judicial decisions and protracted timelines often extending beyond the lifetime of individuals involved add a layer of complexity to the responsibilities of PLWs.

The KS's and PLW's worked around these systemic challenges to change the gendered practices. However, some of these factors being external to the program, are often difficult to influence. The lack of decision-making power among women farmers due to inadequate land ownership and poor access to essential resources hampers the swift adoption of sustainable agricultural practices. Achieving equitable access to resources, particularly priced assets such as land in a patriarchal society, can take generations.

The slow progress is exacerbated by external factors such as climate change, the time required for degraded soils to improve, the labour-intensive nature of sustainable agriculture, reliance on resources like dung and cattle urine which may not always be readily available, and the lack of contiguous lands making it harder for interventions to manifest broad-scale effects. These challenges are worse for smallholder farmers as financial uncertainty makes it difficult for them to prioritize food security and take risks associated with transitioning to sustainable agriculture.

The absence of a comprehensive approach to sustainable agriculture across the government and market ecosystem also contributes to the limited impact of interventions, underlining the need for a holistic approach that considers both external factors and the specific needs of different segments within the agricultural landscape.

6. Understanding the STIBS framework for Utthan's programme

The Theory of Change (ToC) for Utthan's STIBs (Annexure III) identifies the problems perceived, the key barriers that impede women's empowerment and resilience, the specific STIB interventions and activities involved, followed by the observed outcomes and expected outputs that lead towards long-term impacts.

In India, 73.2% of women are involved in agriculture but only 12.8% own land. The gendered impact of climate change is evident, as women, with limited capacity and lacking safety nets for

response, adaptation, and mitigation, become more vulnerable to its effects. These challenges hinder women's economic empowerment and contribute to a cyclical pattern of resource scarcity and subsequent shocks. Utthan's STIB program reveals how lack of land rights impedes women's recognition as farmers, limits access to vital information, credit, and market linkages, and increases their vulnerability, ultimately impacting food security, health, and perpetuating indebtedness and poverty. Barriers are institutionalized and reinforced by market and state systems, negatively impacting women by limiting their access to property rights and subjecting them to control mechanisms and violence for non-conformity. Additionally, the devaluing of women's household work, often unpaid, stems from societal expectations that position women as primary caregivers. The vulnerability of women farmers is heightened by the absence of political will in the governance system, which fails to recognize women as workers, further perpetuating gendered notions.

The study found that inadequate education, security, and social welfare fail are deterrents to awareness of women's land rights. Poor access to technical skills (scientific methods of agriculture) and services (access to mobile, social media, technology, etc.) for knowledge building further devalues them as citizens and workers. Moreover, the civil bodies that undertake a majority of the awareness and gender responsive efforts are often over-burdened and under-resourced. Sustainable/eco-friendly agricultural practices are time consuming as opposed to chemical farming and therefore, considered a deterrent to profit making. Since it also eats into their time, women are reluctant to make the switch to sustainable farming. Also, inadequate access to safety nets and inappropriate response mechanisms to combat failure in agriculture add to the reluctance. The study found that internalized notions of patriarchy and strict conformation and adherence to obstructive social and cultural norms also create barriers for women in adapting to new knowledge and technology.

Having recognized the multi-layered and multi-faceted vulnerability of women farmers, Utthan intervenes by identifying women farmers and building their capacities as lead farmers or *Krushi Sakhis* (women from the community) by training them in 13 POPs – testing soil health, preparation of Jeevamrut and Beejamrut, etc. The *Krushi Sakhis* in turn identify and collectivize 90 women farmers and build their knowledge on the benefits of sustainable farming, the negative impacts of using chemical fertilizers, among other topics, using audiovisual aids. They also introduce women farmers to the concept of food security and the health and economic benefits of consuming organic food.

While training is an essential technical intervention, its success depends on how it is bundled with social interventions of collectivizing women farmers. The collectivization not only acts as an accelerator for the process of shifting to sustainable farming through the peer-to-peer learning model but also forges solidarity and sisterhood among the women farmers, creating a social support structure for them. The support system within their own community facilitates learning from each other's practices and sharing the challenges they face on the farms and in their personal lives. Utthan further comes together with the government and NGOs like ATMA and KVK to conduct exposure visits where women farmers observe the demonstration of different techniques of sustainable farming. These linkages also help the selected as well as women farmers who are interested to receive better variety of seeds, tool kits, free of cost for experimentation. Apart from farm related interventions, Utthan provides a socio-legal security to the women in the community by making them aware of the services of the Nyay Samiti of the

Sanghathans established by it. The women feel empowered as they can reach out to the Sanghathan in instances of violence against them. *Krushi Sakhis* connect women farmers to PLWs who help women in registering land in their name. They also identify and prioritize women farmers who are widowed or in need of immediate access to land rights.

With these STIBS (see Outcomes in annexure 3), the women farmers reported increased decision-making power in farming activities. They were seen as 'agents of change' within their families, had greater mobility that enabled them to visit the local market for personal needs. With greater access to land rights and support from collectives, incidents of domestic violence were also reportedly less. Utthan's version of STIBs has empowered women working as *Krushi Sakhis* and PLWs. They stated that their work had enhanced negotiating power within their families and communities. Their confidence and self-esteem have grown as they network with the police, lawyers, and doctors as part of their work. Moreover, the capacity to assist others, particularly vulnerable women, by registering them for welfare schemes like the Ayushman Bharat card, widow pension, and accompanying a woman survivor of violence to the police or the lawyer, has given them respect in their communities.

This case study underscores that providing technical training alone in agriculture is insufficient for women farmers. Structural barriers, including societal norms, hinder women in families and communities, limiting access to markets and social protection schemes, thereby increasing their vulnerability. Economic gains, without concurrent socio-political reforms, do not yield sustainable results for women farmers. Utthan's approach involves bundling socio-technical interventions concurrently, creating an interdependent, evolving, and permeable system. This ecosystem, including interventions at various levels through KS and support from PLWs, Nyay Samiti, Arthik Samiti, etc., has effectively empowered women farmers. Solidarity and collectivization have improved women's lives through support and peer-to-peer learning, leading to increased decision-making in agricultural practices, economic gains, food security, access to land rights, enhanced mobility, and reduced violence against women in communities. Therefore, to transform women's roles as farmers and citizens and make them climate change-resilient, the strategic integration of various empowering tools and systems across family, community, market, and state, such as STIBs, is crucial to achieve women's economic empowerment.

7. Conclusion

From the beginning Utthan has been clear in its intention of building women's leadership and agency even while it worked on interventions such as forming water collectives, building various sanghathans, improving agricultural practices, food security, etc. This conscious understanding of its core work around the empowerment of its women members is reflected in the way the various interventions and strategies have been 'bundled' which is reflective as a STIBs practice in moving towards climate smart and sustainable agriculture for women farmers in Gujarat,

Utthan has adopted the scientific knowledge around sustainable agriculture and prioritized women's local knowledge (eg, mixing buttermilk for making jeevamrut) by welding the two to develop its 13 PoPs. It has facilitated on and off farm training of women farmers through a cadre

of trained master trainer in the shape of Krushi Sakhis, who themselves are women from the same communities. The *Krushi Sakhis* adopt a peer-to-peer learning model which has helped in faster adaptability of the interventions and more uptake of sustainable farming in these villages. Training of Krushi Sakhis, who have limited literacy levels were trained using audio-visual mediums and participatory activities and games. They use similar techniques while trining women and have also been provided with tablets for them to show A/V materials. Further, Utthan has also formed linkages with KVKs/AUs which provide vital and useful information for better production. Further, women farmers are supported with crucial climate smart techniques such as drip irrigation, mulching, etc, which are most beneficial for production in saline soil present in this region.

Utthan's belief is that women's agency is a critical lever for impactful use of perspective, skills, and tools. It is instrumental for equitable participation in decision-making and actions for the transition to sustainable agriculture & use of technology.To build this agency, it has crucially positioned PLWs for raising awareness and advocate land rights for women. This has resulted in some members to get joint registration of land with their spouses while some others have got their names registered the land in their name post their husband's death. The PLWs work as a bridge between the women and government systems and connect them to *Swabhoomi Kendras* and *Nyay samitis* (justice committees run by women from the sanghathans) for socio-legal-psychological support for distressed women farmers.

With increased agency, women farmers have also begun to participate in discussion in Village Development Committees (VDCs). These simultaneous technical and social interventions and innovations is also helping women to identify themselves as farmers and the community and the state to recognise women farmers. the empowerment of women farmers through technical knowledge, gender sensitization, and support mechanisms not only enhances their decision-making powers and economic opportunities but also fosters a transformative shift towards prioritizing food security within communities and the broader agricultural landscape. In essence, by recognizing and supporting women farmers, we not only cultivate thriving agricultural communities but also sow the seeds for a more resilient and sustainable future for all.

Annexure I: Interview guides

Women farmers: In-depth interviews

Personal details

1. Name
2. Age
3. Social category
4. Highest formal education completed
5. How important is education to you?
6. What are your children studying and where?
7. Household size and family members
8. Who is the head of the household?
9. Occupation of the respondent
10. Engagement in paid work (up to three) over the last 12 months
11. Primary source of income of the household
12. Secondary source of income of the household
13. Do you have land registered in your name? If not, on whose name is it? Is it jointly owned?
14. Are you part of any collective, like women's group, self-help group, etc? If so, what is your role? Do you hold any position in the community?

Work and asset ownership

15. What does a regular day in your life look like?
16. How many hours do you spend on the farm? How many hours does your husband or other male family members spend on the farm?
17. What activities do you do on the farm?
18. Do you have livestock? If so, which ones? How many hours do you spend on them?
19. Who owns and manages the livestock?
20. Do you own any other asset, like jewellery, land, tractor, etc.?

Unpaid and care work

21. What unpaid tasks are you involved in at home (cleaning, cooking, etc.)?
22. What unpaid tasks are you involved in outside the home (fetching water, taking care of livestock, firewood collection, ration, etc.)?

23. What direct or indirect care work are you involved in (childcare, elderly care, sick or disabled members of the family, etc.)?
24. How many hours of a typical day do you spend on unpaid and care work?

About farming

25. Which other family members are involved in farming along with you?
26. What is the average land size you own?
27. What crops do you grow?
28. In how many seasons do you grow crops? Which ones?
29. Are you engaged in seasonal employment?
30. What are your sources of irrigation? How much does it cost?
31. Where do you purchase seed from? Who purchases them?
32. Where do you sell the crops? Who sells them?
33. Do you use pesticides and insecticides?
34. What farming instruments do you use (weeder, sprayer, pump, tractor, etc.)?
35. Who do you take farming-related advice from?
36. Do you have a KCC card?
37. Have you availed of a loan? If so, for what purpose, how much and what was the source (moneylender, SHG, bank, relatives, friends, etc.)?
38. In an emergency, where would you source money from (savings, relatives, friends, SHGs, panchayat, moneylender, would not be able to recover the emergency expense etc), with or without interest?
39. In the last 5-10 years, have you experienced climate change in terms of changed seed quality, changed production, rainfall, soil health, quality of crop, etc? Explain in detail what exactly were the changes. What kind of problems are faced and how do you deal with them?
40. How do unexpected events like drought or heavy rainfall add to your burden on and off the farm?

Decision making related to agriculture

41. Who is the primary decision maker on farming activities, what crop to grow, where to buy seeds from, where to sell the crop, etc.?
42. What kinds of crops do you grow, now that you have a say in what to grow versus what the men used to grow?
43. What factors influence the choice of crop (better earnings, food security, own consumption, health, environment-friendly, etc.)? How do you make these choices?

44. Who has control over the income from the farm?
45. Do you have a say in how the income will be used/invested?
46. Do better yield and profits lead to better negotiating power for yourself in terms of personal consumption, economic decisions for the household, in the market and interventions in the community?
47. Are you part of any collective or FPO? What is your role or activities that you have undertaken as part of these collectives?

Decision making in the household

48. Who has the most say in the following decisions:
    a. Where to educate children
    b. Purchasing assets
    c. How much to spend on social events like marriage, death
    d. When to consult a doctor
    e. What to cook daily
    f. Whether to take a loan or not, and if yes then from where/whom?

Utthan's intervention in the village

49. What specific interventions of Utthan did you implement? Why?
50. Of the 13 POPs, which ones do you implement on your farm?
51. Are there any interventions that did not work for you? Why?
52. How and in what ways has Utthan's peer-to-peer learning model helped you?
53. How did you come to know about a *krushi sakhi*? Did she approach you?
54. What role did the *krushi sakhi* have in your farming?
55. How long did it take you to get used to the shift that the intervention demanded?
56. Do you participate in the gram sabhas?
57. What resources did you need and how did you access them?
58. What has the impact of the STIBs been on:
    a. Agriculture:
        i. Better production and less cost
        ii. Access to water
        iii. Improved seed variety through seed treatment
        iv. Improved soil health and reduced salinity

1. More cropping seasons
2. More savings
3. Access to instruments like weeders and sprayers, and how does that help
4. Organic compost
5. Kitchen garden

v. Access to market
vi. Crop protection

b. Income and livelihood changes post intervention:

i. Effect on migration

c. Other changes:

i. Financial literacy
ii. Better health outcomes
iii. Reduced migration
iv. Reduced violence
v. Access to schemes such as Pradhan Mantri Kisan Samman Nidhi (PM-KISAN
vi. Improved food security
vii. More leisure time
viii. Ability to use time and energy in doing other things – take up leadership roles, go to meetings, etc.

Post-intervention changes

59. What changes have you observed in the:
    a. Community/ society
    b. Village
    c. Family - within the household
    d. Yourself (in terms of agency, time, health)

Land rights

60. Were you aware of your rights?
61. Is the land in your name?
62. How did you get your rights on the land?
63. How many years did you struggle for this right?
64. Did you know where to go and whom to reach out to for legal/ financial support?

65. What kind of issues did you face to avail the rights that you deserve? (corruption, documentation, lack of cooperation from government officials, lack of money, time, awareness)

66. Mapping individual interventions with direct results:

a. Capacity building workshops - Participation in gram sabha

b. Exposure visits - mixed cropping

Krushi sakhis: In-depth interviews

a. Name

b. Age

c. Social category

d. Highest formal education completed

e. Household size

f. Family members

g. Gender of the household head

h. Are you a farmer? If yes, for how many years?

i. Do you have land registered in your name? If yes, for how long? If not, then whose name is the land on?

j. What did you dobefore becoming a *krishi sakh* ?

k. Describe your experience as a *krushi sakhi*

l. How did you get connected with Utthan?

m. How did you get selected as a *krushi sakhi* ?

n. What motivated you to be a *krushi sakhi*? What motivated you to continue being one?

o. How did you start the work in the village? (organizing women farmers, going house to house, awareness camps, etc)

p. How does the peer-to-peer learning model unfold for you?

q. What and where is their work site?

r. Who do you consider as women farmers?

s. How many women farmers did you start working with and how many are there now?

t. What types of training did you undergo with Utthan (what has been taught), and how frequently are they conducted?

2. How does gender remain a consistent theme when receiving training on agricultural practices? How is gender integrated into such training?

    a. How do you disseminate learnings from the training to women farmers?

b. What are the activities/ interventions you facilitated for the women farmers in the village?

c. How did you go about it?

d. What works and what does not work? (villagers not wanting to do soil testing because of costs, low participation in awareness sessions due to distance)

e. What steps do you take when something does not work out? How do you adapt to that? How do you resolve those issues and ensure successful outcomes? (For example, when women were not attending VDC meetings during the sowing season, meeting times were adjusted.)

f. What are the visible and invisible impacts of your interventions in the village? (in-depth response)

g. What was the status of the women farmers before you started the work and after it?

h. How do you do follow-ups with women farmers?

i. How do you report back to Utthan?

j. What are the spillovers of these women farmer groups to other women of the village?

k. How do you think climate change is impacting women? (in terms of agriculture, employment, household burden, economic opportunities, etc.)

l. What challenges do (1) you and (2) women farmers face on the farm and as a KS?

m. What challenges do (1) you and (2) women farmers face as women in homes, with regard to unpaid care work, etc?

n. Do you get support from the gram panchayat, sarpanch, your family, and community?

o. What personal benefits do you derive from this position and your work, such as gaining respect within society or establishing an identity as a farmer leader?

p. How does a gendered perspective flow in all your interventions with women?

q. What transformation do you observe in society and among women in terms of changed attitudes and beliefs following your intervention?

r. Land rights:

    i. How do you work with PLWs? What is the division of work, roles and responsibilities?

    ii. What is your scope of work on land rights?

    iii. Why are land rights important for you?

    iv. In how many villages are you working on land rights?

    v. How many women have your reached through your program on land rights?

    vi. What are your major learnings from working on land rights?

    vii. What are the issues that you face?

    viii. What are the challenges of working with government officials?

ix. What positive changes do you see in women who have got their rights?

x. Why do you think despite years of efforts women have not been able to secure land rights?

Para-legal workers: In-depth interviews

Personal details

a. Name

b. Village

c. Age

d. Education

e. Social category

f. Household size and family members

g. Gender of the household head

h. Primary source of income

i. Secondary source of income

j. What did you do before becoming a PLW?

k. Years of experience as a PLW

l. How many hours a day/ days per week do you spend on your work as a PLW?

m. What does a regular day in your life look like?

n. Are you a farmer? If so, for how long?

o. Do you have land registered in your name? If yes, how did you get it on your name? If no, why not?

About work

1. How did you learn about Utthan? How did you get associated with them?
2. What motivated you to become a PLW?
3. How does the peer-to-peer learning model work for you?
4. How many villages are you working in? Name them.
5. How many women have you been able to reach through your program?
6. Why are land rights important for you?
7. How do you receive training from Utthan? What kinds of training are given?
8. How does gender flow throughout the various aspects of land rights in the training? Give some examples.
9. How do you carry forward your learnings from the training to other women farmers?

10. What kinds of women come to you with their land issue? Who are they? How do they connect to you? Do they know when you will be available and how to approach you?
11. How do they come to know about you?
12. What is your operating model?
13. How do you start working on a particular case?
14. How do you proceed with the case?
15. How do you report back to Utthan?
16. How frequently do you do follow-ups?
17. What is the role of VDCs in facilitating the work you do?
18. What is the role of Swa bhoomi kendra? How is it helpful?

Challenges faced and learnings

19. What challenges do you think women farmers face?
20. What challenges do you face in terms of your own work and that of PLW's? How do you manage both?
21. What works and what does not work?
22. How do you address and resolve work-related challenges?
23. What insights have you gained personally? What have the learnings been from the experience?
24. How have you benefited from working as a PLW?
25. How have your views on gender evolved since embarking on your journey as a para-legal?
26. What do you understand about gendered dynamics and the impact of patriarchy based on your trainings?
27. How is the experience of working with government officials? Which officials do you meet as a part of your job?
28. What have been the learnings and challenges of working with government officials?

Impacts

29. How do you define success? What does it mean to you?
30. How have things changed after women got their land rights? Give examples.
31. What are the impacts of women securing rights on:
    a. Agriculture
    b. Decision making in the household
    c. Burden in the household (unpaid work)
    d. Income-generating activities
    e. Society/ community.

Annexure II: FGD Guides

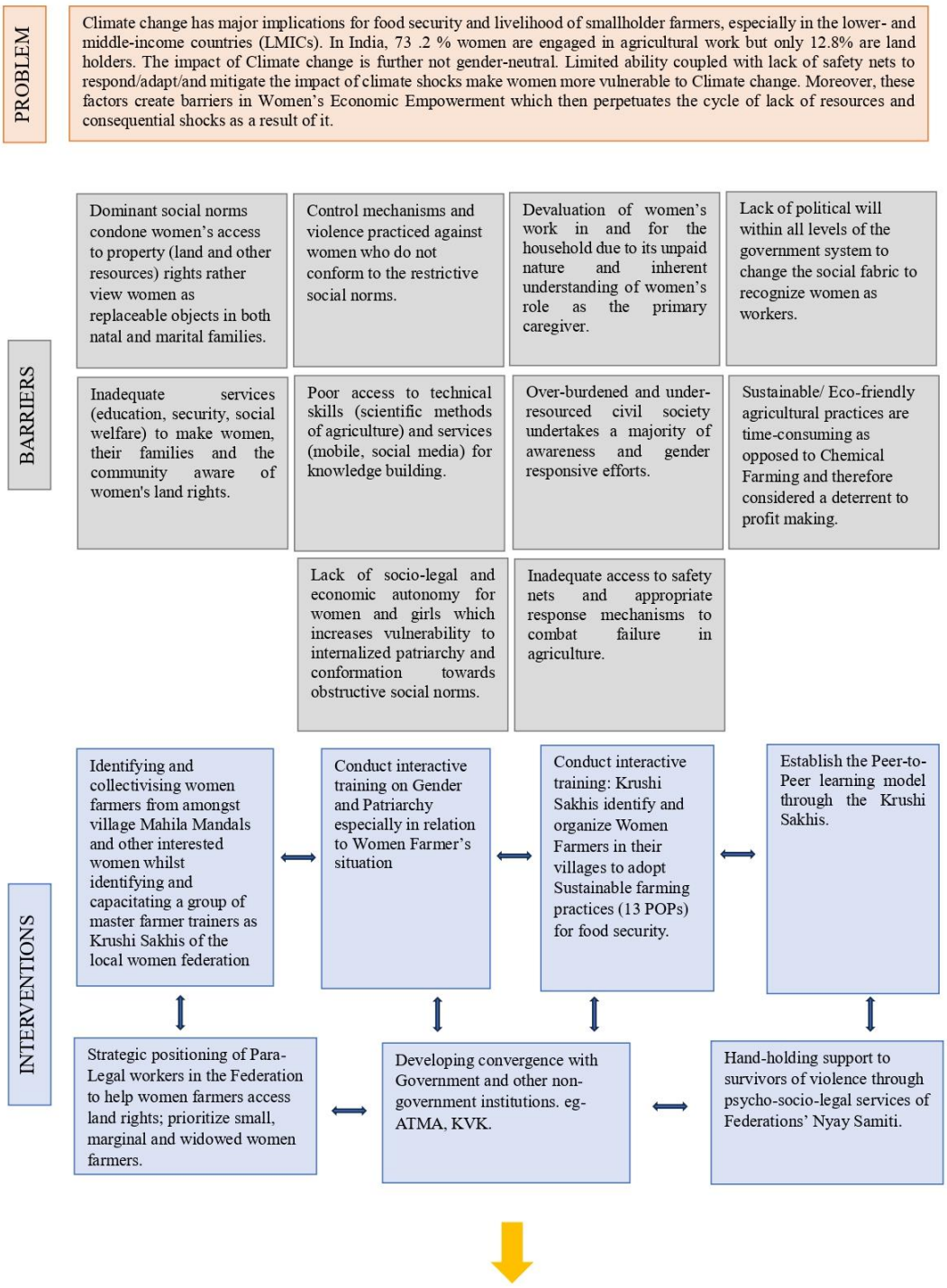
FGDs with *Krushi Sakhis*

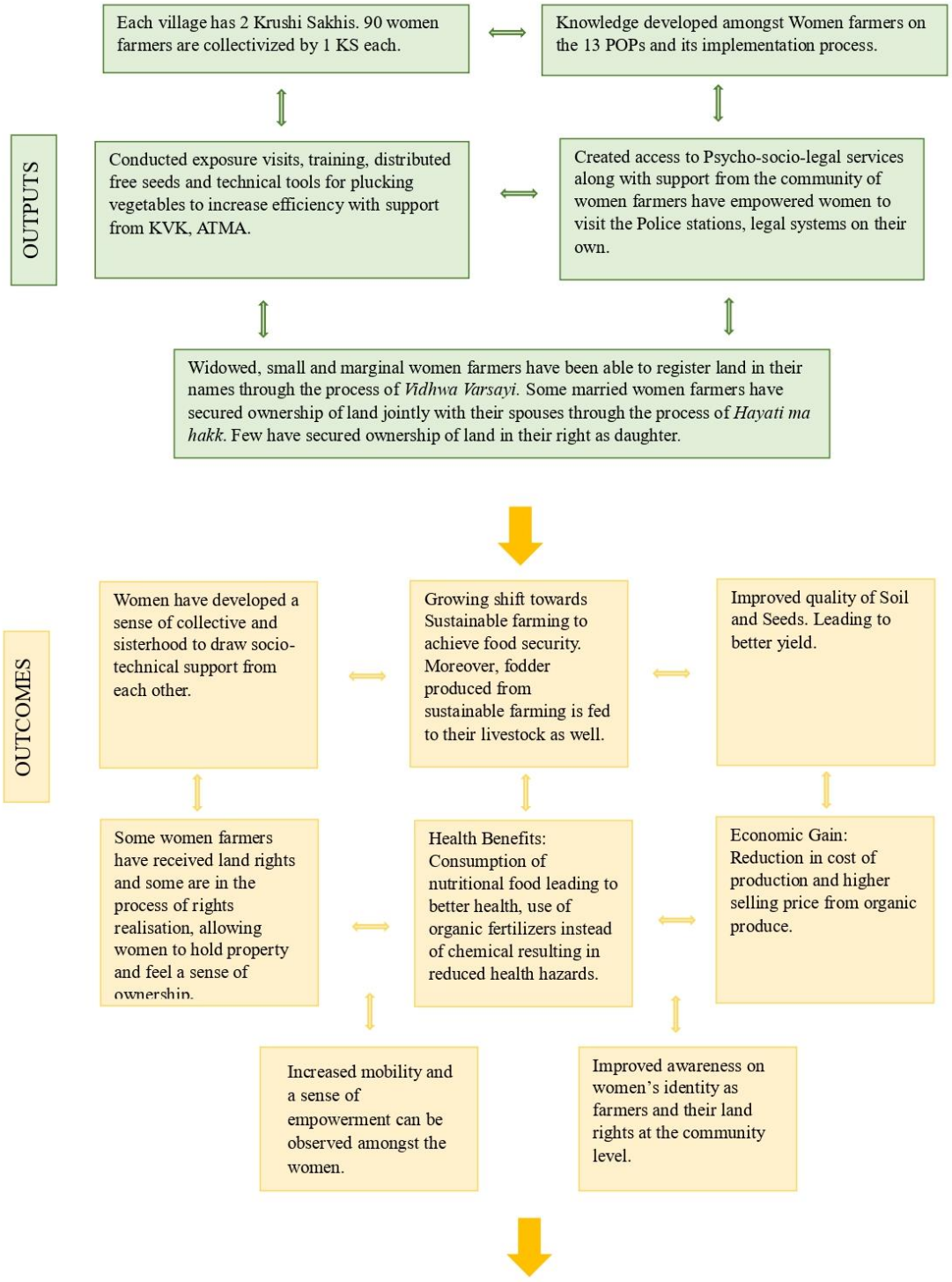
1. What motivates you to work as a *Krushi Sakhi*?
2. What are the positive changes in terms of beliefs and attitudes you see in:
    a. Yourself (interest to learn new things, attending more workshops, stepping out of the home)
    b. Your household (reduced migration)
    c. The community (participation of women in gram sabha)
3. What are the positive changes in terms of knowledge and skills that you see in:
    a. Yourself (reduced dependence on men for fertilizer because of knowledge of making own fertilizer, increased income, etc.)
    b. Your household bb. Community
4. How does climate change impact women? In what ways?
5. How does your work mitigate that? How does it make women more resilient and empowered?
6. How do you bring change in the larger community?
7. How has becoming a KS boosted your confidence?

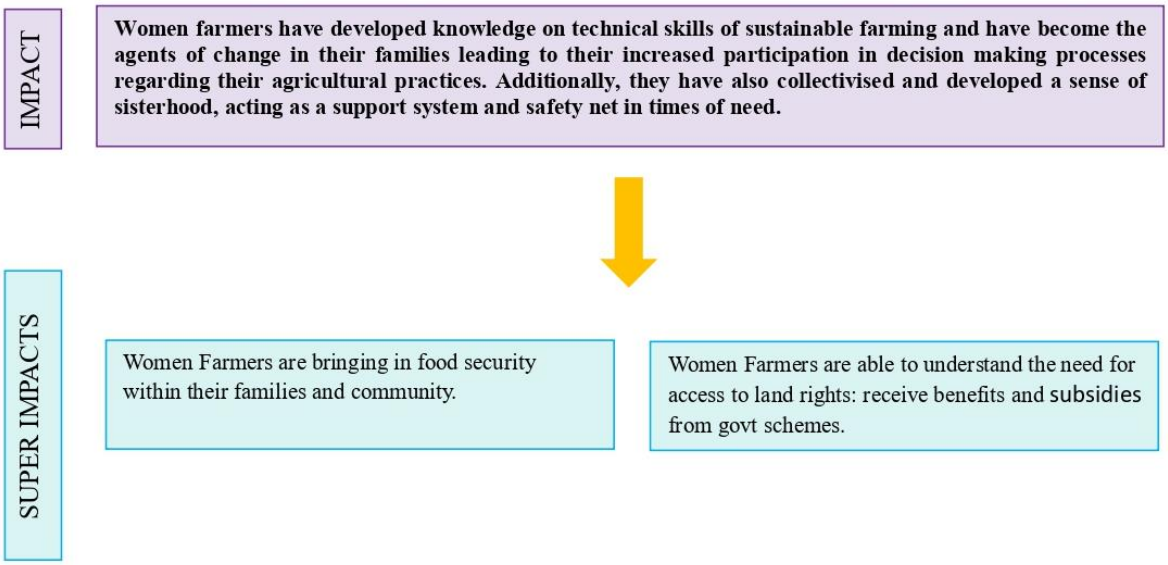
FGDs WFs:

1. How was your experience with farming pre Utthan's intervention (STIBs)?
2. How was your experience with farming post Utthan's intervention (STIBs)? – understand farm productivity
3. What have you learnt or would like to pass down as a crucial knowledge through practice of STIBs in farming?
4. What are the benefits of implementing STIBs?
5. What are the challenges of implementing STIBs?
6. How do you access the market for your farm products?
7. Has there been a change in market linkage after Utthan's intervention?
8. What changes have you observed in the context of your workload – both paid (farming) and unpaid (livestock rearing, household work etc) post implementation of STIBs?
9. Do you think implementation of STIBs could help other women farmers? Why/Why not?

Annexure III: Utthan's STIBs for Empowering Women Farmers – A Theory of Change (ToC).




OUTPUTS
Each village has 2 Krushi Sakhis. 90 women farmers are collectivized by 1 KS each.
Knowledge developed amongst Women farmers on the 13 POPs and its implementation process.
Conducted exposure visits, training, distributed free seeds and technical tools for plucking vegetables to increase efficiency with support from KVK, ATMA.
Created access to Psycho-socio-legal services along with support from the community of women farmers have empowered women to visit the Police stations, legal systems on their own.
Widowed, small and marginal women farmers have been able to register land in their names through the process of Vīdhwa Varsayi. Some married women farmers have secured ownership of land jointly with their spouses through the process of Hayati ma hakk. Few have secured ownership of land in their right as daughter.
OUTCOMES
Women have developed a sense of collective and sisterhood to draw socio-technical support from each other.
Growing shift towards Sustainable farming to achieve food security. Moreover, fodder produced from sustainable farming is fed to their livestock as well.
Improved quality of Soil and Seeds. Leading to better yield.
Some women farmers have received land rights and some are in the process of rights realisation, allowing women to hold property and feel a sense of ownership.
Health Benefits: Consumption of nutritional food leading to better health, use of organic fertilizers instead of chemical resulting in reduced health hazards.
Economic Gain: Reduction in cost of production and higher selling price from organic produce.
Increased mobility and a sense of empowerment can be observed amongst the women.
Improved awareness on women's identity as farmers and their land rights at the community level.


IMPACT
Women farmers have developed knowledge on technical skills of sustainable farming and have become the agents of change in their families leading to their increased participation in decision making processes regarding their agricultural practices. Additionally, they have also collectivised and developed a sense of sisterhood, acting as a support system and safety net in times of need.
SUPER IMPACTS
Women Farmers are bringing in food security within their families and community.
Women Farmers are able to understand the need for access to land rights: receive benefits and subsidies from govt schemes.

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INITIATIVE ON
Gender Equality

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