

Impact Assessment Study under Holistic Rural Development Programme (HRDP) Yavatmal, Maharashtra-P0306



Prepared For:



HDFC Bank Corporate Social Responsibility (CSR)

Prepared By:



Intellecap Advisory Services Pvt. Ltd.

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List of Acronyms

| | |
|--------------|---|
| APL | Above Poverty Line |
| ATMA | Agricultural Technology Management Agency |
| BaLA | Building as Learning Aid |
| BPL | Below Poverty Line |
| COVID | Coronavirus disease |
| CSR | Corporate Social Responsibility |
| DBT | Direct Benefit Transfer |
| EGP | Earthen Gully Plug |
| FGD | Focus group discussions |
| FPO | Farmer Producer Organisation |
| GIS | Geographical Information Systems |

| | |
|----------------|--|
| HH | Household |
| HRDI | Holistic Rural Development Index |
| HRDP | Holistic Rural Development Programme |
| IDI | In-depth Interview |
| INR | Indian Rupee |
| IVC | Intensive Vegetable Cultivation |
| KII | Key Informant Interview |
| KVK | Krishi Vigyan Kendra |
| MGNREGA | Mahatma Gandhi National Rural Employment Guarantee Act |
| MHM | Menstrual Hygiene Management |
| NGO | Non-Governmental Organization |
| NRM | Natural Resource Management |
| PPE | Personal Protective Equipment |
| SHG | Self-Help Groups |
| SIED | Sanjeevani Institute for Empowerment and Development |
| WASH | Water, sanitation and hygiene |
| WUG | Water Users Groups |
| ZP | Zilla Parishad |

Executive Summary

The Holistic Rural Development Programme (HRDP) is the keystone initiative spearheaded by HDFC Bank and executed through non-governmental organizations (NGOs) across various states. Its primary objective is to provide tools and means to the rural population to grow and prosper both socially and economically. It is meticulously designed to address the critical needs of select villages, identified in close collaboration with their respective communities within a specific geographical region. This impact assessment report is for the project P0306 which was implemented in twelve villages of Babhulgaon and Yavatmal tehsil in Yavatmal district, Maharashtra, during January 2020 to December 2022. Sanjeevani Institute for Empowerment and Development (SIED) was the implementing partner and facilitated implementation of key activities under four focus areas i.e. Natural Resource Management (NRM), Skill Training and Livelihood Enhancement (ST&LE), Health and Sanitation (H&S) and Promotion of Education (PoE). The project was implemented in a total of twelve villages and data collection for this report was carried out in ten villages. Both quantitative (400 beneficiary households) and qualitative interviews (6 FGDs, 10 IDIs, and 4 KIIs) were conducted for assessing the impact of the project interventions over the communities in the above-mentioned focus areas.

Natural Resource Management

The project supported a range of activities, including check dam construction, gabion structure, and earthen gully plug to replenish the groundwater level. Farm bunding, sprinkler sets, drip installation, trellis farming and farm pond construction ensured effective irrigation management on the fields. These interventions resulted in a 14 percent increase in average irrigated land. Additionally, over 96 percent of the sample households reported an increase in average net income from INR 80,000 to INR 1,15,000, since the start of the project. Reasons for this shift can be attributed to interventions in irrigation, agricultural installations and expansion of land area under cultivation. Crop diversification was a valuable tool for farmers who wanted to improve their yields. Approximately 40 percent out of the total surveyed households reported growing diversified crops. Around 19 percent of households practiced wheat cultivation which increased to 25 percent after the project implementation. Major crops grown in the area were arhar, cotton, and soyabean. Per acre productivity increased 35 percent for arhar (from 160kgs/acre to 215kgs/acre) and 33 percent for cotton (500kgs/acre to 667kgs/acre). Integrating organic farming practices such as vermi pits and Shivansh¹ composting decreased the use of chemical fertilizers and pesticides. Almost 57 percent of the respondents reported that they increased the usage of natural fertilizers by following methods of compost such as vermi pits.

In the 12 study villages of Yavatmal, 10 solar streetlights were installed in each village. The streetlights installed under the project were effective, with 93percent of beneficiaries confirming that these streetlights are operational and about 98 percent beneficiaries expressed a sense of safety for women and young children during evening.

Skill Training and Livelihood Enhancement

Trainings on farming techniques, nature farming, water budgeting and workshops on project sustainability were organised in the project villages. A total 61 percent of the training recipients reported that these sessions were a useful guide. Respondents were better equipped to increase productivity of their land and the trainings helped them to reduce their input costs. Two

¹ Shivansh method is a short duration method of composting which uses farm waste including weed, crop residue, fodder, green garbage, kitchen and food waste available with farmer.

community level workshops were conducted to ensure project sustainability after the completion of the project. These workshops focussed on:

- Engagement of local stakeholders in decision-making
- Establishing partnerships with local organizations, government agencies, and other relevant stakeholders
- Implementing monitoring and evaluation systems to identify areas for improvement, and adjust strategies

39 percent out of the total households surveyed benefitted from Self-Help Group (SHG) development. SHG beneficiaries were supported in setting up a saree centre, a *sevai* machine, a flour/spice mill and xerox machine among others. A proportion of 97 percent households stated that their SHGs were completely functional and members regularly engaged in group activities including meetings, bookkeeping, documentation of the meetings and maintenance of attendance records. Total sample households that reported an increase in their ability to save, increased from 73 percent to 96 percent, since the start of the project. The project supported livestock management through targeted interventions such as vaccinations for cows and buffaloes, a new community drinking water tank for cattle and livestock. Seven drinking water tanks were constructed in 7 villages. The water tanks stored approximately 3000 litres of water and was available for use throughout the year, especially during the dry summer months. It served approximately 110 families in one of the villages. The average monthly income from livestock had a 100 percent increase after the intervention. This was a result of a combination of livestock management practices—including vaccinations, health services, and access to market information. Access to market trends and preferences allowed livestock farmers to get an estimate of the products to be sold, which would meet demand. Market connections also facilitated information exchange and adoption of best practices among livestock owners.

Health and Sanitation

For better health and hygiene practice in the project villages, installation of soak pits was promoted in addition to awareness camps and health camps. Soak pits eliminated foul odours and breeding grounds for disease-carrying mosquitoes and insects, while preventing waste water from accumulating around households. Visual communication strategies were employed through wall paintings across the village which conveyed best practices for maintaining good health and hygiene. Nearly 45 percent of the beneficiaries who attended the health camps reported feeling healthier and having fewer illnesses. This could be attributed to the focused approach on preventative measures and awareness building which empowered communities to implement proactive measures against disease transmission within the locality. In the 12 Menstrual Hygiene Management (MHM) sessions that were organised in all the 12 villages, cleanliness, health, hygiene, and nutrition management were the focus of the discussions. Approximately 329 women and adolescent girls attended these sessions and it created a safe space for the participants to talk about health and menstrual issues freely.

Promotion of Education

Digital smart screens were provided to six Zilla Parishad (ZP) schools, and RO water purifiers were installed in nine ZP schools to enhance the teaching and learning process. Data analysis revealed a strong correlation between the implementation of smart classrooms, improved student engagement and academic outcomes. In addition, six units of libraries were set up in ZP schools of four project villages. Having a library in the classroom provides an easy source of reference material for the students on difficult to comprehend assignments. The RO water purifiers were particularly helpful to keep sufficient clean drinking water within school premises. These units had 25 lts of water storage capacity that came with a 200 lts water storage tank. As results

indicate, 83 percent of teachers reported improved student attendance after clean water became available in schools.

The following table outlines the achievements of key income indicators across the baseline and endline of the project. Income from skill was something new for the beneficiaries who had started earning an income from the enterprises or small businesses that they were involved in, after the project began. Similarly for the SHGs, income generation and savings started/restarted after HRDP established new or revived old SHGs in the project villages.

Table 1: Summary of Key Income Indicators

| Income Indicators (based on median) | Before | After | % Change |
|--|--------|--------|----------|
| Average Net Income from Agriculture (INR) | 80000 | 115000 | 44% |
| Average Productivity of 3 major crops (Kgs/Acre) | 540 | 560 | 4% |

HRDI Indicators

The Holistic Rural Development Index (HRDI)² score for P0306 at the completion of the project interventions is 0.70, an increase of 169 percent from the baseline HRDI of 0.26. NRM had a 36 percent change from the baseline. Water conservation measures, including farm bunding, construction of farm ponds, earthen nalla bunds, and check dams have contributed to this increase. Health and Sanitation has been left blank as the criteria indicators were not applicable to this study. However, the wastewater soak pit intervention generated an affirming response and was in tandem with the message of hygiene disseminated by the wall paintings. For PoE, > 300 percent change from the baseline is a testament to the impact of the initiative. Digital classroom as an innovative pedagogical tool was a common response received from teachers and students alike. In addition, 90 percent of the students reported using the water purifier daily.

Table 2: Summary of HRDI Scores

| Domain | NRM | | ST&LE | | PoE | | Total | |
|------------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|
| HRDI Score | Base line | End line | Base line | End line | Base line | End line | Base line | End line |
| | 0.11 | 0.15 | 0.09 | 0.27 | 0.06 | 0.28 | 0.26 | 0.70 |
| % Change | 36% | | 200% | | 367% | | 169% | |

Recommendations

- Introduce water resource mapping using technology such as remote sensing technology, Geographical Information Systems (GIS), and advanced analytical techniques. The technology will pinpoint to areas within a watershed where water generation, accumulation, or loss is high or low. This comprehensive approach will provide insights into potential groundwater reserves, enabling resource management strategies.
- Promote collective farming initiatives that bring small-scale and marginal women farmers together. This approach not only reduces the financial risks associated with individual loans but also distributes the burden of labour and operational responsibilities.

² To evaluate the impact of the interventions, the study has employed the existing HRDI created by the programme. The HRDI is arrived at by defining key outcome indicators for each of the domains and developing a composite index.

- Personal Protective Equipment (PPE) including gloves, masks, caps, shoes, and glasses should be made readily available to all farmers and wage labourers through Krishi Vigyan Kendras (KVK) as a comprehensive approach to promoting safety among farmers. The KVKs could also impart a small training on the proper usage of such protective gear. If the packages are distributed to the farmers, it should include instruction pamphlets in local languages.

1 Introduction

India Meteorological Department data from the 1950s to 2015 indicates a 10-20% reduction in annual rainfall in central India, including parts of Maharashtra. Increasing sea surface temperatures, conversion of forested areas into agricultural land contributes to the situation³. In another data from the Central Ground Water Board, Nagpur, Yavatmal emerged as the district with rate of groundwater decline at 4 metres (2018)⁴. Erratic rainfall patterns and rising temperatures have distinct effects during the summer months when alternative income sources are limited. These could be low crop yield, lasting drought, reduced availability of work due to extreme heat and consequent build-up of debt⁵. This is especially detrimental to the women farmers who have to curtail their working hours from April to June, consequently impacting their earning potential. The Holistic Rural Development Programme (HRDP) addressed the urgent need for targeted interventions that enhanced the resilience of rural women and empowered the communities to cope with evolving challenges of climate change.

1.1 About HRDP

Under the aegis of *Parivartan*, the HRDP is HDFC Bank's flagship CSR programme in collaboration with non-governmental organizations nationwide. The programme focuses on developing human capital, managing natural resources, and improving infrastructure in villages, with the ultimate goal of bringing about a positive socio-economic transformation in the lives of the rural population. Interventions are primarily undertaken in four thematic areas:

- a) Natural Resource Management
- b) Skill Training & Livelihood Enhancement
- c) Health and Sanitation
- d) Promotion of Education

The primary objective of HRDP is to provide tools and means to the rural population to grow and prosper both socially and economically. The HRDP takes a comprehensive approach by addressing various community needs, including promoting economic independence through skill training and livelihood opportunities, enhancing basic infrastructure, and establishing a healthier ecosystem for improved living conditions.

1.2 Objectives of Impact Assessment

This impact assessment study is to evaluate the tangible effects and outcomes of project initiatives. The study has analysed the influence of HRDP on the targeted areas and populations. The assessment provides insights into the effectiveness and sustainability of the project interventions. The study aims at understanding:

- Overall process undertaken for implementing HRDP activities
- Key milestones achieved
- Impact created by HRDP activities
- Challenges faced and how they were managed

³ Roxy, M.K., Ghosh, S., Pathak, A. et al. A threefold rise in widespread extreme rain events over central India. *Nat Commun* 8, 708 (2017). <https://doi.org/10.1038/s41467-017-00744-9>

⁴ Kumar Ravikant and Sen Romit (2021) Water Harvesting and Recharge Structures in Yavatmal District: A Status Check, Institute for Sustainable Communities

⁵ The Wire (2019). [In Yavatmal, Everyone Reels Under the Drought—but the Women Suffer More](#)

The guiding philosophy behind this study is to add value by showcasing successful initiatives and recommending possible ways to address existing challenges.

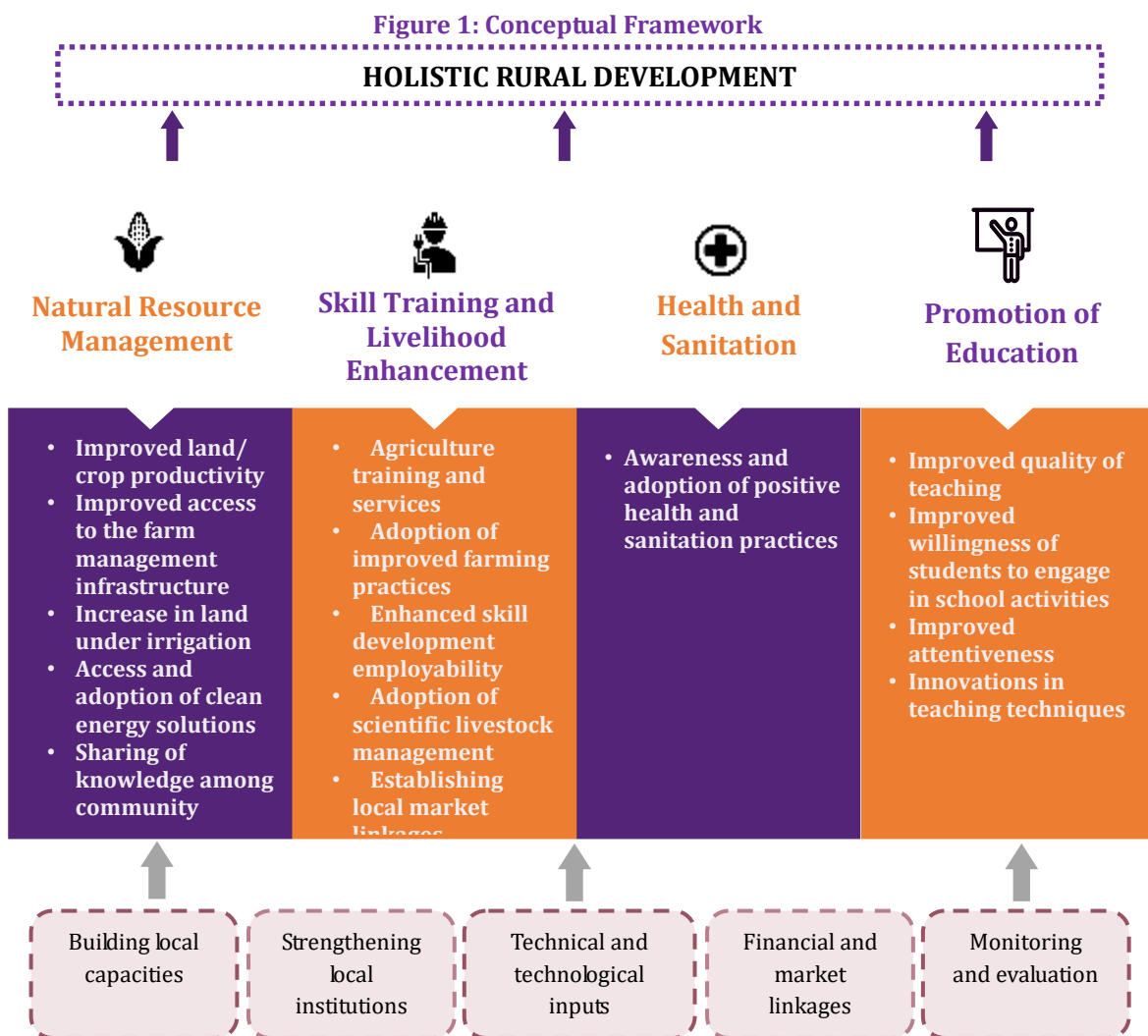
The study seeks to:

- Critically and objectively evaluate implementation and performance
- Determine reasons for certain outcomes or lack thereof
- Derive lessons learnt and good practices
- Provide evidence-based findings to inform future operational and strategic decisions while planning and funding partner organisations

This study was also an opportunity to assess the on-ground relevance and effectiveness of the programme.

1.3 Conceptual Framework Adopted

The conceptual framework and the areas covered under the assessment are depicted below (see Figure 1). The aim is to build local capacities and strengthen local institutions, while giving technical inputs and conducting evaluation across the four thematic areas. The objectives under NRM, ST&LE, H&S and PoE are enumerated in the figure below.



1.4 About the Project Area

The assessment furnishes an independent report on the interventions implemented by HDFC Bank in Yavatmal district of Maharashtra. The programme was undertaken in twelve villages, namely Hastapur, Waiee, Zapatkheda, Umari, Takali, Pimpri, Panchgavan, Nandura, Madani, Kondha, Hatola, and Devgaon under, Babhulgaon and Yavatmal tehsil of Yavatmal district. The extent of the work in each village was undertaken based on the need of the community and varied from village to village. The programme was carried out from January 2020 to December 2022.

1.5 Implementing Partner in the District

Sanjeevani Institute for Empowerment & Development (SIED) works on several projects in rural Maharashtra, with a particular focus on communities such as tribals, marginalised castes, and areas facing land degradation. SIED is operational in multiple districts of Maharashtra, namely, Wardha, Yavatmal, Amravati, Jalna, Nandurbar, Dhule, Pune, Parbhani, Nashik, Ahmednagar, and Thane. Its activities are spread across themes of natural resource management, poverty reduction, livelihood development, and institutional development.

The organization emphasises on empowering women by integrating them into SHGs. It provides resources, including capacity building and material support for the holistic development of the community. The organization works towards for gender-balanced development within families, social spheres, and institutions. SIED has worked on other HRD programmes previously in Wardha, Parbhani and Yavatmal. Two other projects are lined up in Arni (Yavatmal district) and Satana (Nashik district).

2 Research Design and Methodology

The assessment used both qualitative and quantitative methods. The evaluation process was carried out in a consultative manner involving interactions with both the HDFC Bank and SIED team at key junctures.

2.1 Criteria for Assessment

For each cluster and thematic area, activities completed were identified. The impact generated by these activities was assessed using the criterion of:

- Relevance and Convergence
- Effectiveness and Impact
- Sustainability

Under the criterion of **relevance and convergence**, the team assessed whether the design of the programme interventions was:

- a) Aligned with the State's plans and priorities for rural development.
- b) Relevant to the local needs of the most vulnerable groups.
- c) Convergent with (and making use) of the Government's existing resources.
- d) Enabling different stakeholders to work together to achieve the intended outcomes of the programme.

The assessment determined the **impact and effectiveness**⁶ of the programme by examining the values of outcome indicators associated with thematic interventions. These findings were evaluated against the outcome indicators. Qualitative evidence was used to assess the programme impact on the communities. This involved analysing programme outcomes in relation to variables identified (in consultation) with the HDFC Bank. Primary quantitative data findings were supplemented by insights gathered through discussions with community members, teachers, students, entrepreneurs, and local institutions at the village level. The study also evaluated the community's ability to sustain project activities after the project closure.

2.2 Primary and Secondary Data Sources

The primary research included quantitative household survey as well as In-Depth Interviews (IDIs), Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) with programme beneficiaries, and SIED programme team. A total of 6 FGDs, 10 IDIs, and 4 KIIs were conducted in Yavatmal. These interactions involved various stakeholders including SHGs, community members, farmers, panchayat Pradhan, government officials and primary school teachers. The outcome mapping and result chain development was undertaken in consultation with the HDFC team. The exercise resulted in identification of standardized key outcomes and indicators related to each of the programme thematic areas. Based on the standardized list of outcomes and outputs, the questionnaire for the state was developed.

A review of various programme documents including HDFC CSR Policy, Programme log-frame (Logical Framework Analysis), Rapid Rural Appraisal Reports, Programme implementation timelines, Communication, and Documentation Products, and other relevant reports/literature related to the programme was utilized for the secondary review.

⁶ While from an evaluation perspective impact and effectiveness are two different aspects, in the report, these are used interchangeably.

2.3 Sample Size and Distribution

Beneficiaries were selected from ten out of the total twelve villages in Yavatmal where the project was implemented, using purposive random sampling from a list of beneficiaries obtained from SIED. Since beneficiary selection was undertaken independently for each thematic area, the selection of more than one beneficiary from a single household was probable. Similarly, there were instances where a single beneficiary received multiple benefits and support across the four thematic areas. Inclusion of beneficiaries for all thematic areas was ensured. The target sample size across the study villages was 400, and all 400 sample respondents was reached. The sample size covered during the field is as follows (see Table 3).

Table 3: Quantitative Sample Covered

| Thematic Area | Name of Village | | | | | | | | | | Total |
|------------------|-----------------|-----------|-----------|-----------|------------|-----------|-----------|-----------|-----------|-----------|------------|
| | Zapatkheda | Umari | Takali | Pimpri | Panchgavan | Nandura | Madani | Kondha | Hatola | Devgaon | |
| NRM | 48 | 25 | 28 | 43 | 48 | 22 | 49 | 41 | 41 | 33 | 378 |
| ST&LE | 28 | 17 | 24 | 25 | 26 | 17 | 38 | 37 | 35 | 26 | 273 |
| PoE | 0 | 1 | 5 | 4 | 1 | 1 | 1 | 3 | 5 | 0 | 21 |
| H&S | 48 | 21 | 24 | 42 | 43 | 21 | 52 | 40 | 41 | 29 | 361 |
| Total | 49 | 26 | 28 | 44 | 50 | 27 | 53 | 41 | 46 | 36 | 400 |

Data for the assessment was collected from ten study villages. An average of 40 households were surveyed from each of the villages. Out of the total 400 respondents, **26 percent own kutcha houses, 42 percent are residents of semi-pucca houses** and the rest resided in pucca house. Major proportion (80percent) of the households had access to piped water into their plot followed by 10 percent of the study group who use dug well water for drinking purpose. The study area is entirely electrified as reported by all the respondents.

Since there was no baseline available for this evaluation, the recall method was used in the household survey to assess the change that had happened over time. The respondents were asked to recall the value of critical indicators at the start of the programme.

2.4 Training of Enumerators

Teams of local enumerators with requisite education and experience were hired for data collection. Two days of training was conducted for enumerators and supervisors by the Intellecip team at Yavatmal, Maharashtra.

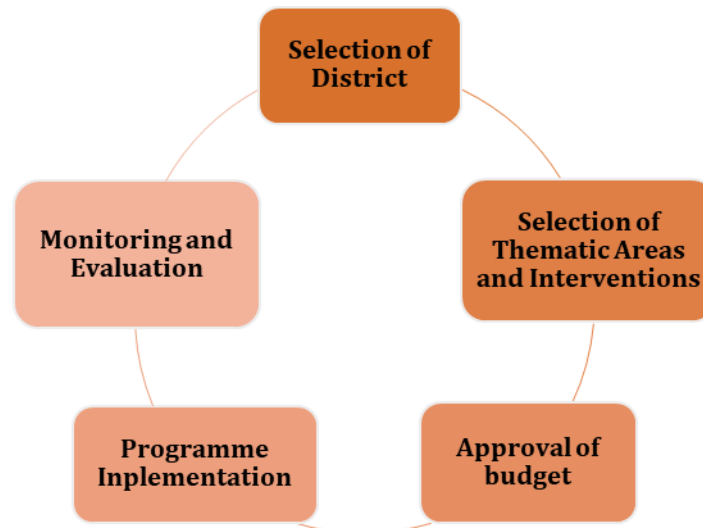
Image 1: Training of field team held at Yavatmal, Maharashtra



3 Programme Planning and Implementation

The planning and implementation of the programme involved five stages: selection of project area viz. district, block, villages, selection of thematic areas and interventions, approval of budget, programme implementation, and monitoring and evaluation. These stages are further explained below.

Figure 2: Planning and Implementation Process



3.1 Selection of Project Area

Yavatmal, a district within Maharashtra, is situated in the eastern part of the state and belongs to the Vidarbha region. The district has a population of 27,72,348, comprising 17 Tehsils and 2,155 villages (2011 Census). Yavatmal is an agrarian region and grows crops such as jowar and cotton. This is supplemented by important cash crops like groundnut, arhar, and soyabean.

Despite its agricultural significance, Yavatmal is faced with acute vulnerability to drought, erratic rainfall, and an alarming number of farmer suicides. In 2019, media reports highlighted the Maharashtra government's declaration of a drought-like

situation in 4,518 villages across the state and 751 villages belonged to Yavatmal. Unpredictable rainfall leads to crop failures and landless farmers are often rendered unemployed. This gives way to large scale migration by the able-bodied men, while the women of the household are left behind to run the household under extreme financial duress.

3.2 Selection of Thematic Areas and Interventions

The HDFC project zeroed in on specific developmental needs within designated regions. It prioritized empowering communities by equipping them with knowledge, skills, and resilience for long-term success. Recognizing the state's development goals, the project integrated social

Figure 3: Area Covered Under the Study



development, infrastructure upgrades, and strong governance for optimal results. It incorporated these aspects through institutional collaboration, promoting efficient farm practices for income generation. Skill-building initiatives were designed for widespread adoption beyond the project's immediate reach.

The agricultural sector saw a boost due to diverse interventions, including judicious use of water for farming, and organic farming techniques. Educational institutions were also strengthened through the integration of visual aids.

Increased agricultural output, water resource development, entrepreneurial opportunities, and capacity building led to income growth for villagers. The income stability helped reduce seasonal and distressed migration from the region.

3.3 Project Implementation

The project provided farmers with essential tools and knowledge to boost their agricultural productivity. This included distributing seeds, fertilizers, and implements, while also educating them on modern farming techniques.

Water scarcity was addressed through NRM interventions. Farmers received training in water management practices, and infrastructure like farm bunding, farm ponds, drip irrigation systems, and water sprinkler sets were implemented. Water resource management was a key focus, with earthen nala plug and check dams constructed to conserve water. Additionally, solar lights were installed in villages for clean energy.

Supporting livelihood diversification and income generation was a priority under ST&LE. The programme provided resources for entrepreneurship, including setting up flour and rice mills, spice mills, saree centres, *sevai* (vermicelli) machine, xerox machine, and turmeric mill.

H&S efforts focused on improving household hygiene by installing wastewater soak pits.

Part of PoE, included providing digital screens for Smart Classroom implementation, installing RO water purifiers, setting up libraries, and distributing sports kits.

Table 4: Activities under Four Thematic Areas in Yavatmal

| Activity Category | Activities | Output Indicators |
|---|---|---|
| NRM | | |
| Water Management | Stone bunding, gabion construction, community pond, check dam repair, check dam construction irrigation method (drip), water pump, farm pond construction | Income from agriculture |
| Farm Management | Area treatment, land treatment through farm bunding, tools for agriculture demonstration, trellis farming, sprinkler set | |
| Clean Energy | Solar street light installation | |
| ST&LE | | |
| Agriculture Training and Support | Crop demonstration through PoP, exposure visit | Access to Agriculture Training and Services |
| SHG-Based Women Empowerment | Establishing/Reviving SHG | Skill and Entrepreneurship Development |
| Skill Training | Water Budgeting Training, Project Sustainability Training and workshop, Reporting back to the to the community (distribution of info booklets) | Skill and Entrepreneurship Development |
| Livestock Management | Livestock management training/health camp/training, awareness generation campaigns Livestock Drinking Water Tank | Livestock Management |

| Activity Category | Activities | Output Indicators |
|---|--|--|
| Entrepreneurship Development | Setting up/Strengthening of FPO, agarbatti Making, general Store, poultry farming, flour mill, masala kandap/mill, saree centre, sevai (vermicelli) making machine, sewing machine, xerox centre/stationary shop | |
| H&S | | |
| Health | Health camps/sessions, menstrual hygiene, awareness/MHM training | Health services |
| Sanitation | Household waste water soak pits | Health Infrastructure and Services |
| Kitchen Garden | Green Village-fruit tree plantation in backyard | Nutrition service |
| PoE | | |
| Educational Institutions Development | Smart/digital classes construction (Parivartan kaksh), library set up (books, shelves, books), BaLA (Building as Learning Aid), RO Filter, sports equipment, COVID Awareness Programme | Infrastructure in Educational Institutions |

3.4 Monitoring and Evaluation

For rigorous oversight, the HRDP followed a set of monitoring and evaluation methods agreed upon by implementing partners. This included periodic submission of progress reports on project implementation to the HDFC Bank. Additionally, bank representatives made planned trips to the project villages, inspected the work firsthand, and spoke directly with the project beneficiaries.

The HDFC Bank requested project information from the implementing partner. The partner managed project data, detailing village-wise activities, beneficiaries, and expenditures. The partner submitted an annual progress report along with the plan for the next year to the HDFC Bank. This document summarized activities implemented, outputs delivered, and outcomes achieved.

In addition, the HDFC Bank hired Intellectap as an external agency to conduct impact assessment of the project after one year of project completion. This was an independent assessment that evaluated using four criteria: relevance and convergence, impact and effectiveness, sustainability, and replicability. This is backed by the creation of a Holistic Rural Development Index (more details in Annexure B) based on selected outcome indicators. The impact (Annexure C) of each activity has also been calculated and classified as high, medium, or low impact. The annexure goes into greater detail on these.

4 Study Findings

This chapter explores findings across the four thematic areas. The initial section delves into NRM, addressing irrigation management, agriculture income, crop diversification, and the adoption of clean energy solutions. Subsequently, the chapter analyses the impact of ST&LE, emphasizing agriculture training, and skill development. The following section focuses on H&S and provides insights into health and sanitation infrastructure. The concluding section on PoE presents findings on infrastructural development, such as drinking water station, in educational institutions. Each section includes impact observations and case studies.

4.1 Demographic Profile

The study area exhibits the household composition of ten surveyed villages in Yavatmal and Babhulgaon tehsil under Yavatmal district. Cultivation is the predominant livelihood for 72 percent of households, wage labour at 49 percent closely followed by livestock. The education status reflects a range, with the majority having completed education up to the 9th to 10th standard (32 percent). Kutcha houses constitute 26 percent, semi-pucca houses comprised 42 percent, and 33 percent indicated pucca house ownership.

Table 5: Distribution of Sample (n=400)

| Age of the Respondent | | Sources of Income | | Status of Education | |
|------------------------------|-----|-----------------------------|-----|----------------------------------|-----|
| 18 to 25 Years | 7% | Cultivation | 72% | Illiterate | 6% |
| 26 to 35 Years | 22% | Wage labour | 49% | Literate but no formal education | 4% |
| 36 to 45 Years | 32% | Livestock | 33% | Up to 5th std | 15% |
| 46 to 55 Years | 21% | Pension | 31% | 6th to 8th std | 16% |
| Above 55 Years | 18% | Non-agricultural income | 13% | 9th to 10th std | 32% |
| Poverty Status | | Salaried Employment | 7% | 11th to 12th std | 22% |
| Antyodaya | 24% | Type of House | | Graduate | 6% |
| BPL | 44% | Kutcha house | 26% | Post graduate | 1% |
| APL | 31% | Semi-Pucca house | 42% | Social Category | |
| Do not have ration card | 1% | Pucca house | 33% | Scheduled Caste | 10% |
| Gender of Respondents | | Gender of Head of HH | | Scheduled Tribe | 35% |
| Male | 57% | Male | 87% | Other Backward Classes | 55% |
| Female | 44% | Female | 13% | General | 1% |

The subsequent sections highlight the key findings from the field survey conducted to assess the impact of the programme after its completion.

4.2 Natural Resource Management

The NRM activities have impacted 378 sample beneficiaries, encompassing agricultural activities and clean energy initiatives with some overlap. The project supported a range of activities, including check dam construction (26 new dams and repair of 17 dams), gabion structure (12 units), earthen gully plugs (11 structures), farm pond construction (8 ponds), farm bunding, sprinkler set installation, organic manure application, drip installation, and trellis farming (on 6 plots).

4.2.1 Irrigation Management

The data indicates a positive shift in the proportion of households reporting an increase in total irrigated land. Before the project, 80 percent of households reported irrigated land, and post-implementation, this figure increased to 86 percent.

The **average irrigated land increased by 14 percent**, from 3.5 acres before the project to 4 acres after implementation.

The data revealed a trend in continuity of activities introduced during the project. Project activities such as farm bunding, gabion structure, sprinkler irrigation had been regularly used and maintained by the beneficiaries. This was corroborated

during the group interviews with some of the farmers, who used the sprinklers on a patch of land, increased the bulk of total crop production and bought more sprinkler sets to deploy on additional land areas. Improved access to irrigation provided by the check dams had empowered farmers to cultivate during both the Rabi and Kharif seasons. The village sarpanch from Takali village said that they irrigated a minimum of 50-acre land solely from the check dam water.

Figure 4: Proportion of HHs Reporting Change in Total Irrigated Land (n=160)

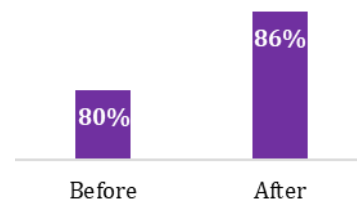
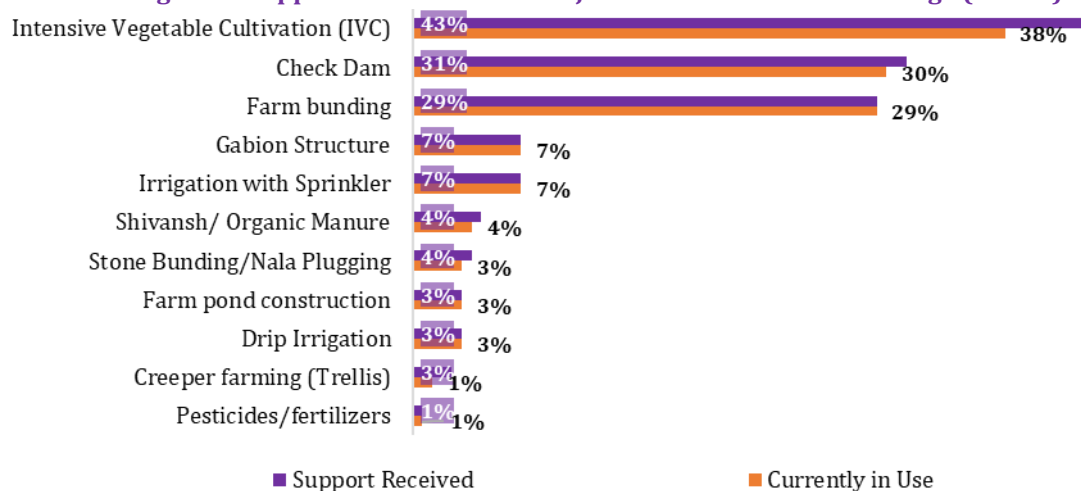


Figure 5: Support Received from Project and Status of Current Usage (n=160)



4.2.2 Income from Agriculture

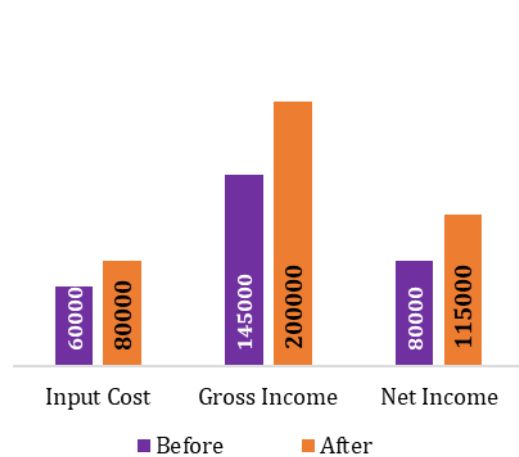
Data indicates that 96 percent of the sample households reported an increase in agricultural income since the start of the project. To further substantiate, households reported a gross annual income of INR 145,000 before the project which increased to INR 2,00,000 after. **The average net income from agriculture increased from INR 80,000 to INR 1,15,000 after the project implementation.**

It was unanimously stated by the respondents that the input costs in the fields had increased. This was attributed to a rise in the prices of inputs (88 percent). Additionally, 36 percent of respondents mentioned that the increase was due to enhanced awareness, leading to changes in input choices. Another 36 percent cited increased usage of chemical fertilizers and pesticides as a driving force behind the rising costs. Additionally, with access to improved irrigation facilities, more land area has been brought under cultivation adding to the expenses.

Table 6: Reasons for Increase in Income (n=153)

| | |
|---|-----|
| Interventions in agri installations | 21% |
| Interventions in farming techniques | 4% |
| Interventions in irrigation | 39% |
| Interventions in organic farming | 4% |
| Interventions in soil testing and land treatment | 4% |
| Other HDFC interventions | 33% |
| Market Prices | 71% |
| Weather conditions | 75% |
| Increased area under cultivation | 8% |
| Better production due to reasons other than HDFC Bank project interventions | 4% |
| Support from other projects/institutions | 1% |

Figure 6: Increase in Agricultural Income (in INR, median value)



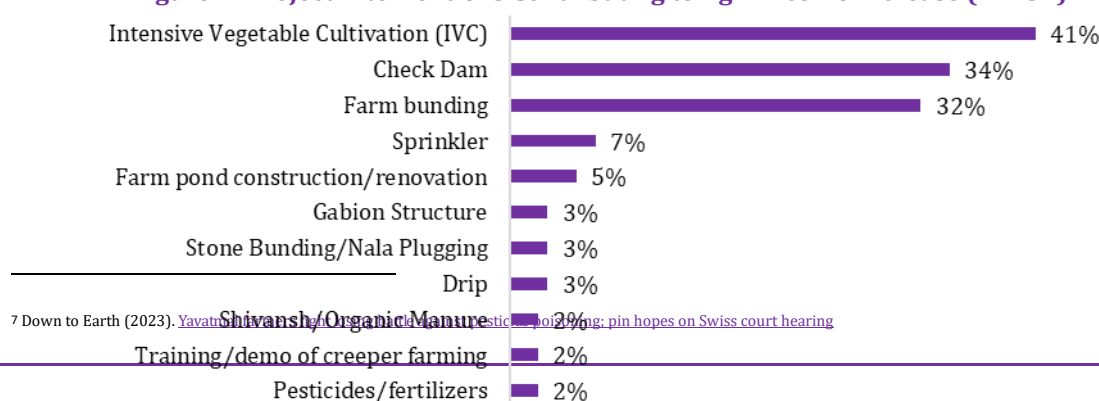
Higher usage of chemical fertilizers and pesticides come with a trade-off in this situation. India is one of the foremost global producers and consumers of pesticides and Maharashtra leads in its usage of pesticide in farming (Department of Agriculture and Farmer Welfare). The Vidarbha region including Yavatmal, is a primary hub for cotton cultivation which utilizes a large amount of pesticide. Farmers frequently express concerns about health-related issues arising from the routine use of pesticides in agricultural practices⁷. Therefore, while it contributes to the increase on income, farmers must gradually shift to organic manure.

Reasons behind the increase in income were diverse. 71 percent of the respondents pointed to receiving fair market prices against the products. Interventions in irrigation were identified by 39 percent as a contributing factor. Additionally, 21 percent recognized the impact of interventions in agricultural installations. A smaller group of 8 percent beneficiaries acknowledged that expansion of land area under cultivation translated to additional output and income. For 75 percent of the farmers, weather conditions remained favourable during the cropping season and was a contributing factor.

After conducting a 2-sample z-test on agricultural income, the p-value was 0.6 against a z-statistic of 5.4 (at 95 percent confidence level), indicating that it is significant. The detailed calculations are reflected in the Annexure (D).

Some of the specific project interventions like Intensive Vegetable Cultivation techniques (like trellis farming), check dam and farm bunding played a major role in augmenting farming income. Additionally, 7 percent acknowledged the impact of sprinkler sets, while 5 percent credited farm pond construction or renovation for the shift in income. Utilizing the profits generated from trellis farming, a beneficiary from Madani villages purchased 52 goats in total. Subsequently, 22 goats were sold, fetching INR 8,000 per male and INR 10,000-11,000 per pregnant female (doe).

Figure 7: Project Interventions Contributing to Agri Income Increase (n=134)



⁷ Down to Earth (2023). [Yavatmal: pin hopes on Swiss court hearing](https://www.downtoearth.org.in/news/pesticides/2023-02-28-pesticides-2023-02-28-102296)

Data analysis reveals varied production levels across different crops amongst households. Approximately, 79 percent and 75 percent of households reported an increased production of arhar (pigeon pea) and soybean, respectively, with cotton production showing the most significant rise at 83 percent. Irrigation support, such as installation of drip and sprinkler irrigation systems, has been fundamental in enhancing productivity, underscoring the importance of efficient water utilisation and modern irrigation practices in agricultural improvement.

Table 7: Reasons for Increased Production of Crops

| Intervention | Arhar (n=92) | Soyabean (n=60) | Cotton (n=105) |
|----------------------------------|--------------|-----------------|----------------|
| Irrigation support | 30% | 25% | 32% |
| Organic farming | 2% | 7% | 6% |
| Soil testing and land treatment | 2% | 3% | 2% |
| Farming techniques | 3% | 2% | 5% |
| Agricultural installations | 23% | 22% | 25% |
| Weather | 87% | 85% | 82% |
| Area increased under cultivation | 2% | 7% | 4% |

On average, 18 percent of the respondents faced decrease in production for all three crops. Weather conditions feature both as a factor for increased and decreased production which could be due to localized variations in rainfall.

Table 8: Reasons for Decreased Production of Crops

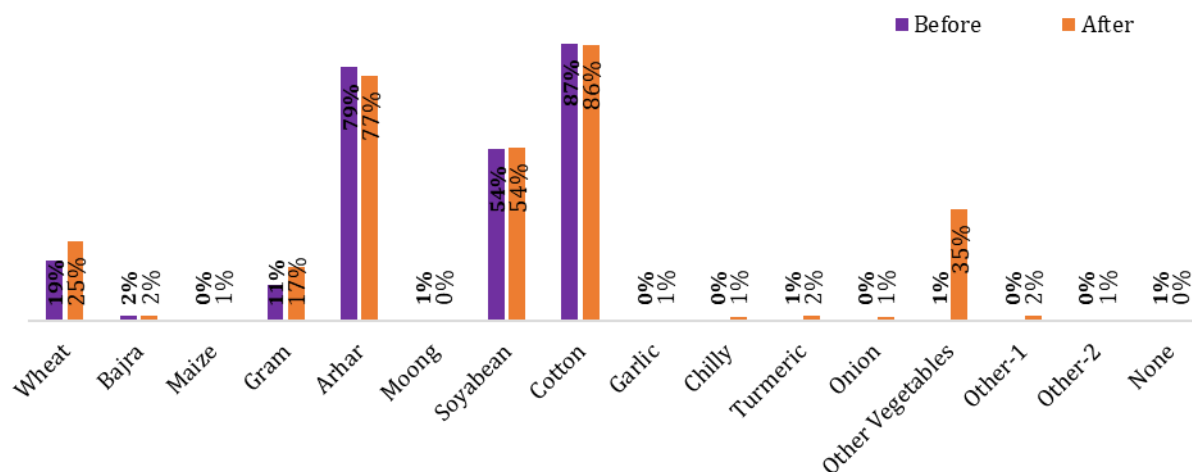
| | Arhar (n=21) | Soyabean (n=15) | Cotton (n=21) |
|---|--------------|-----------------|---------------|
| Poor weather | 62% | 53% | 29% |
| Decreased area under cultivation of crops | 43% | 40% | 76% |
| Poor irrigation | 5% | 20% | 14% |

4.2.3 Crop Diversification

Crop diversification is an agricultural practice of growing a variety of crops on the same land instead of relying on a single crop. This practice offered several advantages in the study villages, including reduced risk of crop failure, improved soil health, increased biodiversity, and enhanced income. Crop diversification was a valuable tool for farmers who wanted to improve their yields. Approximately 40 percent out of the total surveyed households reported growing diversified crops. The data indicated that prior to the project, 19 percent of households cultivated wheat which increased to 25 percent after implementation. Turmeric, Gram, Maize and Chilly are some other key crops.

Average agricultural production for arhar, soyabean and cotton was 400kgs, 1200kgs and 1400kgs prior to the project. After the intervention, average production for arhar, soyabean and cotton increased to 500kgs, 1500kgs, and 2000kgs respectively.

Figure 8: Households Practicing Crop Diversification Before and After HRDP Intervention (n=160)



The data below is indicative of the increases in productivity per acre for all major crops. Per acre productivity specifically increased 35 percent for arhar and 33 percent for cotton. While cotton is known for being a water-intensive crop, its irrigation is primarily rain-fed as was observed in the project villages.

Figure 9: Productivity per Acre, Median Value (in Kgs) (n=160)



It was also reported by 51 percent of the beneficiaries that they changed the crops grown in their agricultural field since the project started and out of this, 96 percent said that the changes were promoted by the HRD programme.

Some of the beneficiaries (9 percent) received horticultural support with fruit trees like jamun, lemon, mango and custard apple. The recipients planted these in their backyard and 13 percent of them reported that it contributed to better nutrition.

4.2.4 Farming Efficiency

Improved status and quality of production were major areas of impact as reported by 60 and 57 percent of the respondents respectively. Integrating organic farming practices not only decreased

Table 9: Change in Use of Natural/Chemical Fertilizer Before and After Project

| | Natural fertilizer (n=63) | Chemical fertilizer (n=159) |
|---------------------------------------|---------------------------|-----------------------------|
| Increased | 57% | 57% |
| Decreased | 19% | 14% |
| Remained the same | 24% | 27% |
| Did not use before the project | 0% | 2% |

the use of chemical fertilizers and pesticides (51 percent and 46 percent respectively) but aided in efficient usage of water (35 percent decreased need for water) and improved soil health (62 percent improved soil health). **Almost 57 percent of the respondents reported that they increased the usage of natural fertilizers by following methods of compost such as vermi pits (cited by 11 percent) or Shivansh (cited by 62 percent).** While 95 percent of the households did not face any challenge to avail farm management services, 3 percent cited that adoption and maintenance of farming activities was cost-intensive.

Except for project activities such as organic manure and a small percentage (2 percent) for check dam, all other activities have received an affirming response from the users.

Table 10: User Satisfaction with Quality of Support Received

| | Fully satisfied | Somewhat satisfied | Neither satisfied nor dissatisfied | Somewhat dissatisfied | Fully dissatisfied |
|----------------------------------|-----------------|--------------------|------------------------------------|-----------------------|--------------------|
| Farm pond construction/reno | 80% | 20% | 0% | 0% | 0% |
| Check Dam | 76% | 22% | 0% | 0% | 2% |
| Gabion Structure | 73% | 27% | 0% | 0% | 0% |
| Stone Bunding | 67% | 33% | 0% | 0% | 0% |
| Organic Manure | 29% | 57% | 0% | 14% | 0% |
| IVC | 78% | 20% | 1% | 0% | 0% |
| Training/demo of creeper farming | 75% | 25% | 0% | 0% | 0% |
| Farm bunding | 83% | 15% | 2% | 0% | 0% |
| Pesticides/fertilizers | 0% | 100% | 0% | 0% | 0% |
| Drip | 80% | 20% | 0% | 0% | 0% |
| Sprinkler | 100% | 0% | 0% | 0% | 0% |

4.2.5 Use of Clean Energy Solutions

Solar street lights offer clean and sustainable source of energy in communities. The lights enhance safety and security in rural areas by providing nighttime illumination. In the 12 study villages of Yavatmal, 10 solar streetlights were installed in each village. The street lights benefited 90 percent of households in these villages.

About 93 percent of solar streetlight beneficiaries reported that the solar lights are currently operational indicating a high-level sustainability of the intervention. 72 percent of households said to have the solar street lights near their houses signifying the high coverage by the lights at important junctions. A proportion of **98 percent streetlight beneficiaries reported improved safety for women due to the installation.**

Due to the solar street light installation, 99 percent said they can go out during the night feeling safe. “Even if there is a load-shedding in the village, there is ujaala all around”. And 98 percent did not have to be anxious of wild animal attacks during the night.

4.2.6 Impact Observations

The project's effectiveness in enhancing irrigation infrastructure and promoting sustainable water management practices resulted in expanded agricultural capabilities within the community. Majority of the activities had a high impact which is due to the suitability of the interventions in accordance to the weather conditions and water availability.

Figure 10: Overview of Project Effectiveness and Impact of Interventions (NRM)



4.2.7 Case Study

Case Study 1: Trellis Farming Helping Turn over a New Leaf



Bhimrao Sanap, a farmer in the Madani village of Babhulgaon tehsil, Yavatmal, was on the brink of giving up farming due to years of unsuccessful cultivation of soyabeans and cotton. Frustrated and contemplating extreme measures, his life took a

turn when he became a beneficiary of the HRD programme. He received the trellis farming setup (bamboo poles for line posts, heavy gauge wires for tensioning—to provide support for creeper plants and some seeds) and a farm pond that was constructed on a fallow piece of land.

With a total landholding of 1.5 acres, Bhimrao decided to shift from traditional rain-fed soybean and cotton cultivation. In 2021, he began trellis farming, starting with bitter gourd on one acre and cucumber on half an acre. HDFC Bank provided essential support such as bamboo poles and wires, covering half of the initial setup cost. The total cost of the entire set up was approximately INR 30,000 out of which the project contributed half the amount (INR 6000 for bamboo, INR 7000 for wire, some additional amount for seeds).

Bhimrao diversified his crops, introducing fenugreek and spinach after the bitter gourd and cucumber cycles. The cultivation of bitter gourd and cucumber roughly lasts for six months, and fenugreek-spinach are fast growing plants lasting a month and a half. After these two phases of vegetable cultivation, he gives the land a rest during the summer months. He could have used the drip line to irrigate the land or plant more vegetables but electricity during the summer months is erratic and cannot be depended upon for pumping water on a daily basis. While considering the use of a drip line for efficient irrigation, he opted for it after consulting with fellow farmers. The implementation of the drip line proved to be beneficial and reduced the irrigation time to just two hours for the entire farm. Bhimrao's farm pond ensured a continuous water supply for the drip line.

Bitter gourd, cucumber, fenugreek and spinach cultivation is followed by growing tomatoes on the farm. Tomatoes plant growth timeline is similar bitter gourd and cucumber. The economic impact of trellis farming was way more than what he earned from cotton and soyabean earlier. Bitter gourd, fenugreek, spinach, and tomatoes became his mainstays. While the input costs varied (approximately INR 6000 per kg for seeds, INR 50000 for farm labour employment, INR 10000 for ploughing/fertilizer/pesticide, for bitter gourd and tomatoes each), the net profits soared—55k for bitter gourd, 1.5 lakh for fenugreek and spinach, and an anticipated 1.70 lakh for tomatoes.

His foresight extends to predicting higher tomato prices due to water shortages in Marathwada. He expects prices to reach INR 300 per crate, which fetched him INR 100 per crate (22-23 kgs per crate) last season. He has also invested in a power tiller with earnings from bitter gourd sales.

Bhimrao sells his produce directly at the Yavatmal mandi. Each mandi has different product prices the information is available with the farmers as to which mandi is offering the best price. For e.g., the Narayangaon mandi in Pune is offering INR 800 per crate for the tomatoes. However, accessing markets like Narayangaon mandi will require bulk amount of produce to sell, at least 100 crates or 2 tonnes of tomatoes. This could be done if the farmers collectivized at the village level and pooled in their produce.

4.3 Skill Training and Livelihood Enhancement

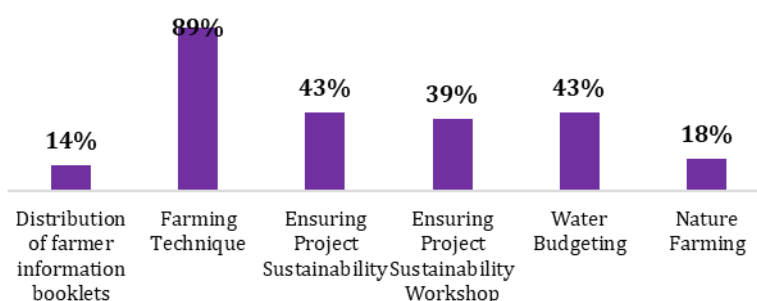
Investing in both skill training and livelihood enhancement is crucial for empowering marginalized communities and driving economic growth. Job opportunities across various sectors remain vacant due to a lack of skilled workers. This disconnect highlights the need for programs that bridge the gap between available jobs and the skills communities possess. To address this issue, the HRDP undertook various initiatives aimed at uplifting the women and farming communities. These involve activities such as organic farming, water budgeting, exposure visits, and conservation agriculture practices⁸ among others.

4.3.1 Agriculture Training and Services

Various trainings were organised for the beneficiaries with highest attendance observed for training on farming techniques (89 percent). A total 61 percent of the training recipients reported that these sessions

were a useful guide. This was exemplified by 73 percent of the respondents who were more equipped to increase productivity of their land. Apart from this, 66 percent cited that the trainings helped them to reduce their input costs. Two community level workshops were conducted to ensure

Figure 11: Proportions of HHs Who Attended Different Trainings and Workshops (n=56)

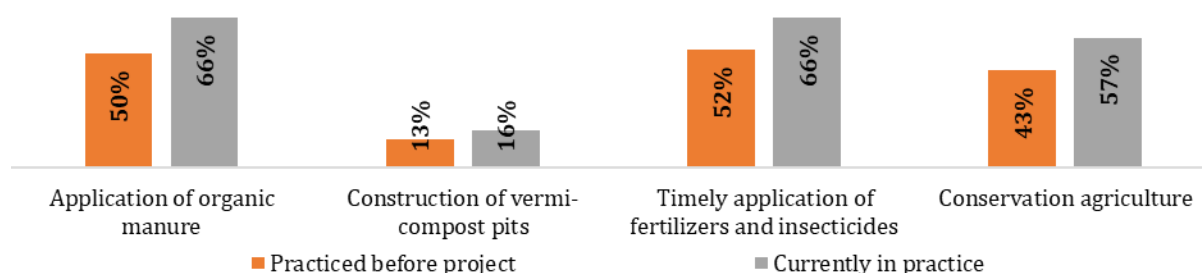


project sustainability after the completion of the project. These workshops focussed on:

- Engagement of local stakeholders in decision-making
- Establishing partnerships with local organizations, government agencies, and other relevant stakeholders
- Implementing monitoring and evaluation systems to identify areas for improvement, and adjust strategies

As evident from the figure below, all the farming techniques saw an increase in practice. Crops like cotton are highly susceptible to pest attacks and the trainings to identify optimal timeline for manure application has helped the farmers achieve better production. This could be attested by 39 percent of the respondents who reported their pest management techniques had improved that resulted in reduced crop loss. In addition, 71 percent confirmed that their income had increased and 43 percent noticed improvement in soil health.

Figure 12: Farming Practices Before and After Project (n=56)



⁸ As defined by FAO, 'a farming system that promotes maintenance of a permanent soil cover, minimum soil disturbance, and diversification of plant species. It enhances biodiversity and natural biological processes above and below the ground surface, which contribute to increased water and nutrient use efficiency and to improved and sustained crop production'.

4.3.2 Economic Empowerment through Collectivization

Within the HRD programme, support was provided to enhance SHG management, lending and savings practices, bank linkages and enterprise management. The project majorly facilitated revival of defunct SHGs, and training of the members. Proportion of 97 percent households stated that their SHG were completely functional and members regularly engaged in group activities including meetings, bookkeeping, documenting the meetings and keeping attendance records. **All the training recipients acknowledged personal savings as one of the primary benefits of being a SHG member.** In addition, 98 percent of beneficiaries observed an increase in

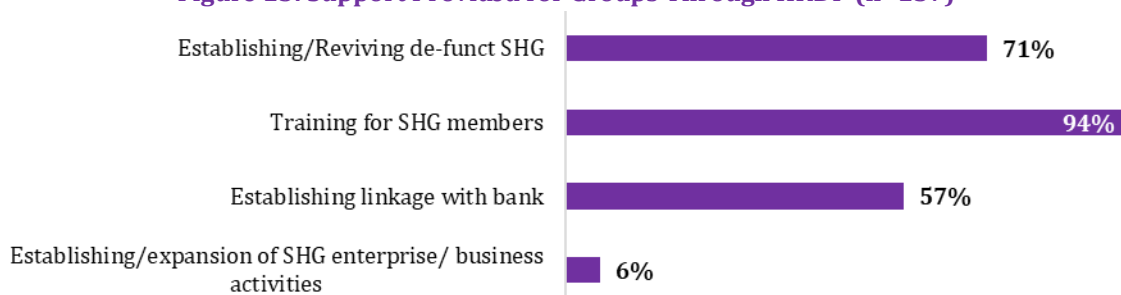
Image 2: Beneficiaries Operating Flour Mill (L) and Spice Mill (R)



confidence to carry out the financial or logistical tasks of the group. As mentioned during most of the FGDs as well, women in the study villages would not come forward or participate in the project activities. As the project initiatives started showing results consistently, women not only gained confidence in their abilities but also found motivation to

achieve financial security. The SHG beneficiaries were supported in setting up a saree centre, a *sevai* machine, a flour/spice mill and xerox machine among others. Total proportion of household that reported an increase in their ability to save, increased from 73 percent to 96 percent. From the FGDs, it was shared that SHG members have attained annual income in the range of INR 30,000 to INR 40,000 through saree centre established with project support. In addition, the *sevai* (vermicelli) making machine generated an income of approximately INR 10,000 per month for three months (February-April).

Figure 13: Support Provided for Groups Through HRDP (n=157)



4.3.3 Skill and Entrepreneurship Development

The skill and entrepreneurship development initiatives instilled a sense of innovation and self-reliance among the community members. The beneficiaries were supported with a thorough understanding of enterprise development. Within this, 50 percent beneficiaries were supported in establishing an enterprise, 43 percent were provided marketing support and a proportion of

There was no monthly income from enterprises prior to the project which stands at INR 2708 per month currently, as reported by the beneficiaries. "It is as if I am a service woman", said Yashoda tai as she spoke about her income from the saree centre that she is a part of.

57 percent respondents received an initial capital investment from the project.

4.3.4 Animal Husbandry

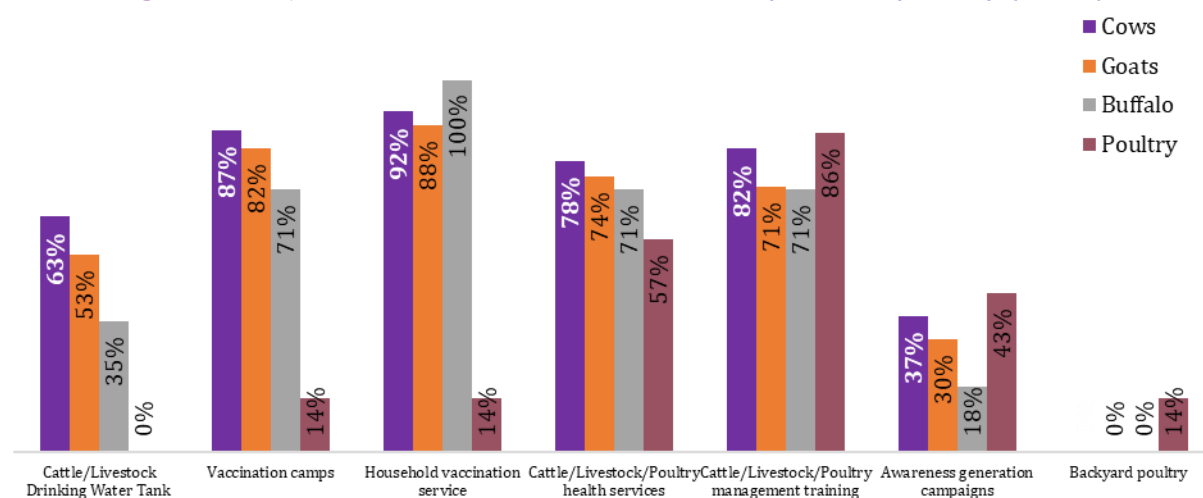
The project boosted animal husbandry through targeted activities for different animals. Cows and buffaloes received vaccinations at their homestead. A new community drinking water tank was built, serving 63 percent of households for cows, 53 percent for goats, and 35 percent for buffaloes. 83 percent of participants reported using the services regularly or applying the knowledge gained to improve their animal husbandry practices.

Drinking water tanks for cattle and livestock were an important activity in the villages. These tanks stored approximately 3000 litres of water and was available for use throughout the year, especially during the dry summer months. It served approximately 110 families in one of the villages. Water availability at the village junction eliminated the uncertainty of not finding water in the grazing area.

Image 3: Drinking Water Tank for Cattle and Livestock



Figure 14: Project Services Availed for Different Cattle/Livestock/Poultry (n=113)



The most consistent benefit across all three categories (cattle, livestock and poultry) was the improvement in livestock health. This led to reduced livestock deaths, improved quality of livestock products, and better household savings.

Table 11: Received Benefits of Livestock Interventions (n=113)

| | Cows | Goats | Buffalo | Poultry |
|--|------|-------|---------|---------|
| Increase in income from livestock | 58% | 67% | 65% | 71% |
| Increase in production | 63% | 59% | 76% | 57% |
| Increase in livestock health | 87% | 79% | 88% | 100% |
| Reduced livestock death | 77% | 73% | 59% | 86% |
| Improved quality of livestock products | 65% | 56% | 53% | 43% |
| Increase in household savings from livestock | 43% | 42% | 29% | 57% |
| Market information | 12% | 14% | 0% | 14% |
| Access to livestock management expert | 3% | 6% | 6% | 0% |

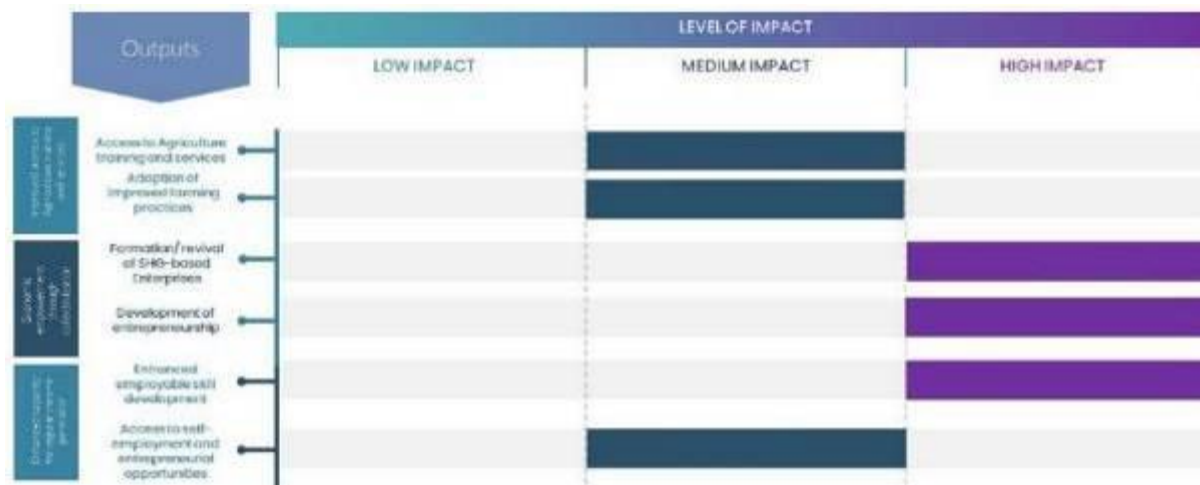
The average monthly income from livestock had a 100 percent increase after the intervention. Before the intervention, the average monthly income from livestock was INR 1000 which increased to INR 2000 after the intervention. A combination of improved livestock management

practices, including vaccinations, health services, and access to market information, led to enhanced livestock health and productivity.

4.3.5 Impact Observations

SHG and entrepreneurship development stood out as the flagship activities within the vertical. Establishing bank linkages, focused trainings with interest groups, reviving the defunct SHGs, and support in establishing various small enterprises were the reasons behind it. Almost 78 percent of the beneficiaries noticed an increase in income from the enterprises as well.

Figure 15: Overview of Project Effectiveness and Impact of Interventions (ST&LE)



4.3.6 Case Study



Case Study: Flying the Coop: Case of Backyard Poultry Farming in Empowering Women

Savita Anil Ghotekar, once a farm labourer from Takali village struggling to earn a living that would not lead her to migrate out, is a HRDP beneficiary of backyard poultry farming. The initiative created financial stability and empowered her to contribute to her daily household expenses.

SIED provided Savita with an initial grant of INR 5000 to set up her backyard poultry. She contributed INR 3000 from her end to complete the setup which poultry chicks, a mesh shed, and some feed. The poultry, primarily focused on country chickens fetches her approximately INR 25,000 annually.

Savita used to sell the eggs at INR 20 per piece to the Anganwadi School. But the school is closed now for

some time and she depends on local customers and the nearby market in Yavatmal to sell the eggs. Apart from the poultry eggs, she also sells the smaller chicks at INR 400 per piece, and the adult birds at INR 700-1000 per piece. The demand for the eggs remains high due to the perceived medicinal values associated with country chicken eggs and the nearby market in Yavatmal is easy to access and has a steady demand. At present, she not only saves some money for herself, but also contributes INR 1500-2000 each month to the household expenses.

The income from poultry facilitated the purchase of a sewing machine worth INR 6000. She receives orders to stitch blouses every now and then from the neighbouring households. Although this is not a regular income, but she gets around ₹200-₹300 every time someone places an order with her.

Savita's success in managing the backyard poultry has not only improved her financial standing but has also impacted her family. Due to the nature of her work as a farm labourer, she had to stay out for the better half of the day. This gradually led to her child dropping out of the school. But with no more need for external employment, she can stay home and her child has re-enrolled in school. Her commitment to self-sufficiency goes beyond purchasing chicks. She even incubates eggs at home, ensuring high-quality breeds and lowering costs.

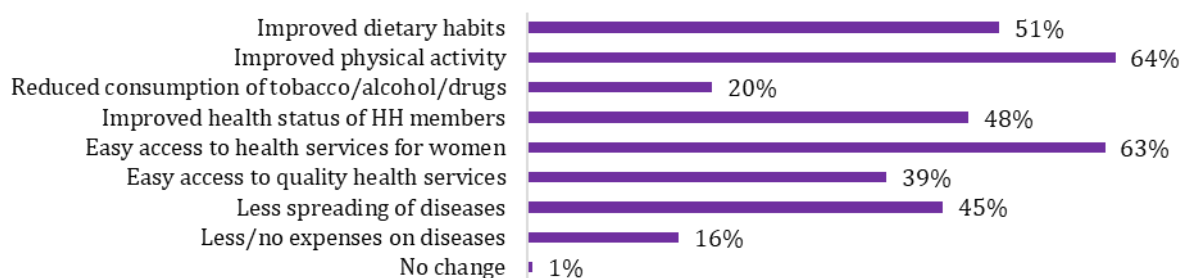
4.4 Health and Sanitation

The programme prioritized well-being of community members by deploying two key strategies: awareness-generation activities and sanitation infrastructure development. 90 percent of households actively participated in hygiene-related awareness sessions. The waste water soak pit construction was availed by 27 percent of the sample group.

4.4.1 Health Infrastructure and Services

Beneficiaries availed different services at the health camps under the HRD programme that included diagnostic services, receipt of medicines, receipts of referrals to specialist medical practitioner. A proportion of 56 percent households attended menstrual hygiene awareness training. Additionally, promotion of best practices for maintaining good health and hygiene was carried out through wall paintings across the village. 98 percent of the total beneficiaries who received a referral to a specialist, consulted with the medical service that they were referred to. Nearly 45 percent of the beneficiaries who attended the health camps reported feeling healthier and having fewer illnesses. These camps focused on preventative measures and awareness building, empowered communities to implement proactive measures against disease transmission within the locality. Health camps proved instrumental in increasing healthcare accessibility for women within the village. The highest proportion 64 percent of respondents reported improvement in physical activity as a result of the awareness building at the health camps.

Figure 16: Perceived Benefits of HDFC Bank Supported Health Camps/Clinics (n=358)



4.4.2 Sanitation Infrastructure and Services

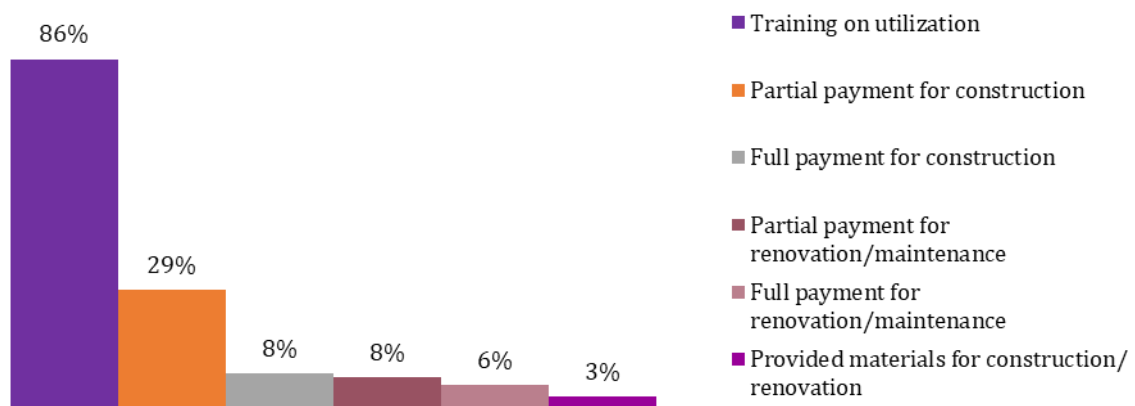
A soak pit plays a vital role in a home drainage system by collecting and disposing wastewater away from the house. Using a soak pit helps in minimizing the release of contaminated water into the environment and contributes to the overall cleanliness of the household.

Soak pits were constructed to dispose household waste water and to promote proper treatment and disposal of waste. One of the key benefits of a soak pit was the cleanliness that could be maintained around the household toilet. There was no accumulation of waste water and consequently no foul odour and mosquitoes could be found.

Image 4: Household wastewater soak pit



Figure 17: Proportion of HHs Reporting Support for Soak Pits (n=106)



4.4.3 Impact Observations

Health and sanitation received a mixed level of impact distributed across low to high. The focus of the thematic area was on small yet impactful sanitation infrastructure development with soak pits. All the responses received for soak pits point towards its utility and sturdiness of the structure.

Figure 18: Overview of Project Effectiveness and Impact of Interventions (H&S)



4.5 Promotion of Education

PoE included renovation of school buildings with BaLA paintings, RO water purifier installation, adding classroom assets such as Smart digital screens/Parivartan Kaksha and a library. Taking up sports was encouraged among the students with the sports kits that were provided.

4.5.1 Infrastructure in Educational Institutions

This study confirmed the contribution of Smart classrooms in enhancing the teaching and learning process. Data analysis revealed a strong correlation between the implementation of smart classrooms, improved student engagement and academic outcomes. A consensus emerged from teachers, who recognised the impact of visual aids on student engagement and knowledge retention. They acknowledged the power of visuals in keeping lessons engaging and preventing monotony, which ultimately led to increased enthusiasm for learning.

Furthermore, teachers reported that having a library in the classroom was an easy source of reference material for the students. That meant complex topics were no longer a challenge to comprehend. Improved understanding resulted in efficient lesson planning, and allowed teachers to cover the syllabus on time.

Before the project, 87 percent of interviewed teachers said schools lacked clean drinking water. A Zilla Parishad school assistant teacher stated, "Students would drink impure water and often fall sick." The project addressed this by installing RO water purifiers in the schools. As results indicate, 83 percent of teachers reported improved student attendance after clean water became available within school premises.

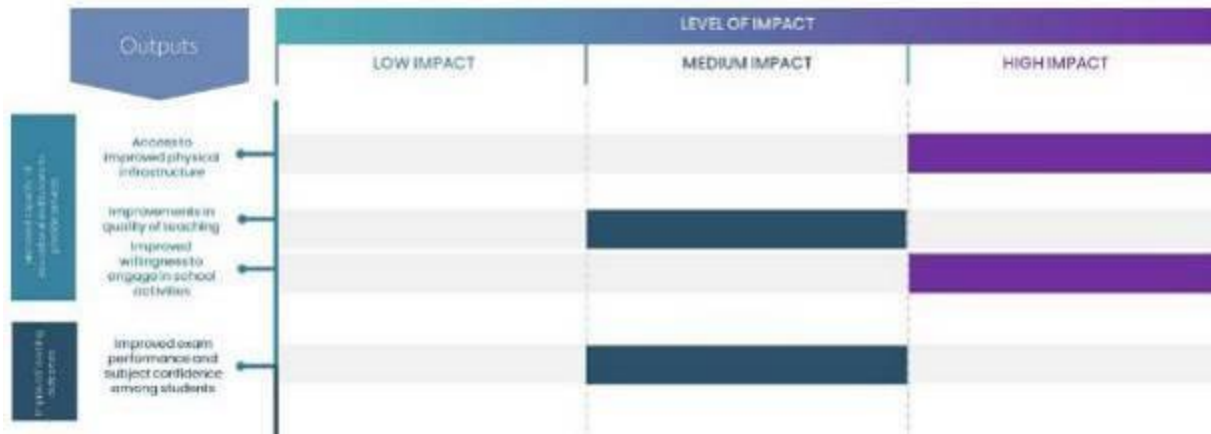
Table 12: Enhanced Learning Outcomes and Reasons for Improvement

| Learning Outcome | Improved attention | Improved concept retention | Increased enrolment | Decreased dropout rates | Improved exam performance/grades | Improved attention span |
|--|---------------------------|-----------------------------------|----------------------------|--------------------------------|---|--------------------------------|
| Reasons of Improvement | | | | | | |
| Classes are more interesting | 96% | 100% | 100% | 100% | 100% | 100% |
| Lessons are covered on time | 92% | 96% | 100% | 95% | 100% | 100% |
| Improved study material | 92% | 96% | 89% | 81% | 82% | 67% |
| Students are attending classes regularly | 83% | 83% | 95% | 90% | 94% | 33% |
| Improved quality of teaching material | 71% | 57% | 89% | 67% | 76% | 67% |
| Innovative teaching methods | 29% | 35% | 32% | 24% | 29% | 0% |
| Access to sanitation | 33% | 43% | 32% | 38% | 29% | 33% |

4.5.2 Impact Observations

The project has had a medium impact in augmenting the quality of learning at school. In addition to developing smart classrooms with digital screens, there was equal emphasis on ensuring clean drinking water in the premises. For added longevity of the Smart digital screens against frequent power-cuts, the project provided an inverter battery along with the screen.

Figure 19: Overview of Project Effectiveness and Impact of Interventions (PoE)



4.5.3 Case Study

Case Study: *Of Classrooms that are Smart—enhancing teaching and learning efficiency*



Zilla Parishad School of Umari village, is a teeming establishment with students from classes 1 to 5. In this conversation with school head master Pravin Babanrao Pardhi, he took the time to explain each activity carried out in the school and how they have transformed the learning environment for the students. “The school received a number of project support that included Baal Vachnalay (School Library), installation of an RO water purifier, introduction of Smart Classroom technology, and provision of sports kits. The initial enrolment numbers of the school ranged from 19 to 22 students, but with strategic interventions, the numbers have increased to almost 32 students now”, he shared.

Smart Classroom:

The digital Smart screen is the first ever interactive pedagogical equipment to be deployed in the entire village. The introduction of a Smart Classroom has boosted teaching efficiency, and made lessons more engaging for students. Teachers find the technology comfortable to use, ensuring regular usage of the digital screen. The TV requires minimal internet requirements and serves as a versatile educational resource, disseminating new information through mediums such as YouTube.

According to headmaster Pardhi, the Panchayat covers the school electricity bills and that ensures uninterrupted use of the Smart TV. The TV has an inverter as well that was provided by HDFC bank. This decision stemmed from insights gained in a prior project, where frequent power cuts resulted in the screen getting corrupt and led to additional repair expenses. An inverter was provided along with the TV eliminate a situation like that.

Baal Vachnalay/School Library:

The library has been in active use for the past three years. Books are distributed every Saturday, encouraging students to take them home for a week. This has fostered a habit of regular reading among children.

RO Water Filter:

Installation of an RO water filter proved instrumental in addressing health concerns related to water quality. Initially, children fell sick frequently due to suboptimal drinking water quality in the area resulting in attendance getting affected. This challenge was overcome to an extent with clean water supply at the school premises all year round. The need for students to fetch water from home repeatedly has diminished as well.

Sports Kit:

Providing sports kits (including equipment for volleyball, cricket, and badminton) has encouraged physical activity among students. Despite limited open space, the nearby farm serves as a playground, with teachers supervising playtime.

Before signing off, headmaster reported about the overall class performance of the students saying, “the students are performing well with their studies and the marks that they obtain have improved over these past few years. In fact, two students from our school were selected at the tehsil level to participate in a quiz competition. There is a renewed interest among the students to attend school instead of an earlier time

when they were often absent from classes. Now if you see them, they will not get out of the school premises until school time is over.”

4.6 Holistic Rural Development Index

The official Human Resource Development Index (HRDI) outlined by HDFC Bank emphasizes the broad objective of achieving holistic rural development through a multifaceted approach. The interventions target interconnected aspects, making it challenging to identify a single impact indicator that accurately reflects the programme's overall effectiveness. To ensure consistency across diverse clusters, HRDI employs standardized indicators in its calculations. The resulting HRDI scores for the examined villages are presented in the table below.

Due to the unavailability of an initial baseline, the programme utilized the recall method to capture the baseline data. Relevant indicators were selected and assigned appropriate weights to determine the significance of each indicator in achieving the desired outcomes across all domain-specific interventions. While a majority of the indicators were suitable for the study in Maharashtra, certain modifications were necessary to align them with the programme objectives and the data collected. Based on our calculation, the HRDI scores for the examined villages are presented in the table below. A comprehensive explanation of the methodology can be found in Annexure B.

Further, the thematic-wise indicators were assigned weights, to arrive at the composite HRDI score of **0.70 indicating a positive impact, from the baseline score of 0.26**. NRM reported a 36 percent improvement from the baseline. This was triangulated from the interviews with village Sarpanch and members of Water User Groups where they recalled average water column depth increasing between 2020 to 2022. The column depth had increased 3 metres approximately. Water conservation measures, including farm bunding, construction of farm ponds, earthen nalla bunds, and check dams have contributed to this increase. Resultantly, the availability of water has led to a 14 percent increase in the area under irrigation.

The H&S thematic area has been left blank as the criteria indicators were not applicable to this study. However, the wastewater soak pit intervention generated an affirming response and was in tandem with the message of hygiene disseminated by the wall paintings.

For PoE, over 300 percent change from the baseline is a testament to the impact of the initiative. Digital classroom as an innovative pedagogical tool was a common response received from teachers and students alike. Investing in such technology and their effective integration within the curriculum hold potential to advance the quality of education and create a stimulating learning environment for students. In addition, 90 percent of the students reported using the water purifier daily.

Figure 20: HRDI Calculation for Yavatmal, Maharashtra

| Domain | NRM | | ST&LE | | PoE | | Total | |
|------------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|
| HRDI Score | Base line | End line | Base line | End line | Base line | End line | Base line | End line |
| | 0.11 | 0.15 | 0.09 | 0.27 | 0.06 | 0.28 | 0.26 | 0.70 |
| % Change | 36% | | 200% | | 367% | | 169% | |

5 Analysis of Assessment Criteria

As outlined earlier in 2.1, for each thematic area, activities completed by SIED were identified and assessed using the following criteria:

- Relevance and Convergence
- Impact and Effectiveness⁹
- Sustainability

The following sub-sections provide an analysis of the HRDP programme with respect to each of these criteria.

5.1 Relevance and Convergence

According to the District Socio-economic Review Report for Yavatmal, groundwater is the primary source to fulfil household and agricultural requirement. A study conducted to check the status of water structures in Yavatmal district indicate that Yavatmal and Babhulgaon tehsil could expand on the groundwater development. Yavatmal and Babhulgaon tehsil have the scope of 15 to 25 percent and 25 to 27 percent to develop the groundwater resources respectively¹⁰. Multiple initiatives for the construction of diverse water management structures can be found throughout the district. These include KT Weir- Kolhapur Type Weir¹¹, nala bunds, check dams, percolation tanks, water storage tanks, and farm ponds.

The trade off in this situation is excessive groundwater resource development would gradually lead to water table depletion. This will translate to drier and deeper existing wells. Therefore, implementing water conservation and recharge measures tailored to the unique aquifer characteristics of the district is key to ensure long-term water security.

The HRD programme employed a mix of water and farm management techniques that ensured a balanced approach to the natural resource development in the study villages. Initiatives such as farm bunding minimized top soil erosion and enhanced soil moisture. Earthen Gully Plug (EGP) decreased water run-off speed and became a water storage structure. The water from the EGP could be used for irrigating agriculture land, and as a source of drinking water for cattle and livestock. Farm ponds were created on fallow lands which became a constant source of water for drip irrigation arrangement on the fields.

Drinking water tanks were constructed at village junctions to ensure that cattle and livestock have access to water. This tank became the source of water even during periods of scarcity, reducing the amount of travel time that had to be spent by the beneficiaries looking for water.

5.2 Sustainability

Sustainable projects promote self-sufficiency and ownership within communities. By building local skills and capacities, they empower beneficiaries to maintain the project benefits. Building sustainability into projects makes it more adaptable and resilient, especially in project areas with environmental challenges.

In Yavatmal district, water scarcity and consequent crop failures and out migration could be commonly observed. The thematic areas of NRM and ST&LE addressed these challenges with the

⁹ While from an evaluation perspective impact and effectiveness are two different aspects, in the report, these are used interchangeably.

¹⁰ Kumar Ravikant and Sen Romit (2021) Water Harvesting and Recharge Structures in Yavatmal District: A Status Check, Institute for Sustainable Communities

¹¹ Or Kolhapur Type Bandhara, is a structure to be constructed transverse to the flow of natural stream channel having gap between two piers to allow the passage to water stream (Roorkee Water Conclave 2020, IIT Roorkee).

carefully designed project interventions that considered the agro-climatic conditions, demographic profile and occupational scenario of the study villages.

Beneficiaries of drip irrigation system cited it to be an efficient model of farming. One drip line lasts up to three years which is a long time. And as reported by Prashant Wagh from Devgaon village who has his entire farm connected to drip lines, input cost of INR 50,000 per acre is fetching them INR 1,95,000 per acre of net profit. Some of the benefits of drip irrigation:

- Maximizes water usage
- Precise watering eliminates unnecessary moisture, decreases weed growth
- Targeted watering protects soil from erosion
- Fertilizers in liquid form reach directly

The check dams were a valuable reservoir to capture and store rainwater. This not only replenished nearby wells and borewells during the rainy season but also provided a reliable source of water for irrigation. The construction of 26 check dams with a combined water storage capacity of 1,12,522 cubic meters had improved agricultural productivity in the region. These structures facilitated expansion of area under irrigation by 917 acres. The check dams were estimated to benefit more than 450 families by providing them with reliable access to water for irrigation purposes.

About 96 percent of the SHG development beneficiaries reported that their group saves regularly at present due to the SHG support and mentioned their average monthly income (median value) was INR 1800 compared to no income before the project.

6 Recommendations

The design and implementation of HRDP in the ten villages of Yavatmal, had lasting impact as depicted through the data results, both qualitative and quantitative. In order to continue with the developments in the area, some of the recommendations that the programme have been discussed here. These have been categorised into three parts as following:

6.1 Recommendations to Sustain Project Initiatives

6.1.1 Natural Resource Management

- It is recommended that the Gram Panchayat and local communities develop a comprehensive plan for the maintenance and effective operation of water resources within the villages. The Water User Group (WUG) in the villages may be entrusted with the responsibility of conducting a regular status check of the check dams, gabion structures and EGPs in the recharge areas and farm ponds or wells in the discharge areas.

6.2 Recommendations to Build Project Efficiency

6.2.1 Skill Training and Livelihood Enhancement

- It is advised that the scope of the project is aligned with relevant state schemes. Although the state offers an array of schemes, their implementation often faces challenges due to resource limitations. For instance, a single Gram Sevak is responsible for overseeing 4-5 Gram Panchayats and, consequently, 10-12 villages. This demands a strategic convergence between the HRD programme team and Gram Sevaks. It could facilitate leveraging relevant state schemes such as MGNREGA, ATMA, and Aaple Sarkar Maha DBT. Such convergence would address the awareness gap among the populace regarding these schemes.

6.3 Recommendations to Strengthen Project Design

6.3.1 Natural Resource Management

- Promote collective farming initiatives, that bring small-scale and marginal women farmers together. Collective farming operates as a joint land and resource management system by a group of farmers. Unlike individual ownership, resources are pooled to enhance productivity and efficiency. Labour and harvest may be shared equally or distributed based on individual contributions. This approach not only reduces the financial risks associated with individual loans but also distributes the burden of labour and operational responsibilities.
- The impact assessment study revealed that usage of pesticides has augmented the agricultural produce, but it is crucial to safeguard farmers from the harmful effects of pesticides at the same time. Hence, it is recommended that PPE including gloves, masks, caps, shoes, and glasses should be made readily available to all farmers and wage labourers through convergence with KVKs. The KVKs could also impart a small training on the proper usage of such protective gear. For improved

communication on pesticide usage, if the packages are distributed to the farmers, it should include instruction pamphlets in local languages.

- Introduce water resource mapping using remote sensing technology, GIS, and advanced analytical techniques. The technology will create a multi-layered picture of the study area's hydrogeological potential. It will pinpoint to areas within a watershed where water recharge, storage, or discharge is high or low. This comprehensive approach will provide insights into potential groundwater reserves, enabling resource management strategies. Other than this, periodic hydrogeological studies can be conducted to understand the groundwater table dynamics, identify potential recharge zones, and guide the placement of future water structures for maximum impact.
- Establish a robust monitoring and evaluation system to regularly assess the performance and structural integrity of check dams and other water structures. This could involve community participation and the use of technology for efficient tracking.
- Develop a water budgeting system for the villages, emphasising efficient water use in agriculture, livestock, and domestic purposes. This can help in equitable distribution and sustainable utilization of available water resources.

Annexures

A Sampling Methodology

The quantitative household survey was administered for four thematic areas in each district.

Quantitative Sample Size Calculation

For this study, the formula for calculation of finite sample size for one-time cross-sectional survey (Cochran's 1977), has been deemed appropriate. The formula used to estimate the sample size for the quantitative household survey is given below:

$$N = Z_{1-\alpha}^2 \times P(1 - P) \times D_{eff} \div (S_e)^2$$

Where,

N= sample size

P= key characteristic of the population, set at 50%;

$Z_{1-\alpha}$ = standard score corresponding to the confidence interval, set at 95% (1.96 for two tailed test);

S_e = margin of error, set at 5%;

D_{eff} = factor for design effect, set at 1 (no design effect)

Thus, the estimated maximum sample size is 400.

Quantitative Sampling Methodology

Sampling methodology to be added

Stage 1 – Selection of villages:

The list of beneficiaries from all the ten villages acted as the sampling frame for the programme. This list was obtained from the implementing partner—SIED. Simple random sampling was done to select the required number of households from within the list. Since beneficiary selection was undertaken independently for each programme, the selection of more than one beneficiary from a single household was probable.

Stage 2 – Selection of beneficiaries:

Sampling for each village was done using the Probability Proportionate to Size (PPS) method. The percentage of the total number of beneficiaries in a village was taken out from the total beneficiaries. This percentage was then converted into a sample per village. A total of ten villages were covered under the survey.

Qualitative Sample Size Calculation

Qualitative tools of IDIs, KIIs and FGDs were administered for obtaining information about the remaining themes as well as to enrich the household survey information with a deeper understanding.

Since there was no baseline available for this evaluation, recall method was used in the household survey to assess the change that has happened over time. For this purpose, the respondents were asked to recall the value of critical indicators at the start of the programme.

B HRDI Methodology

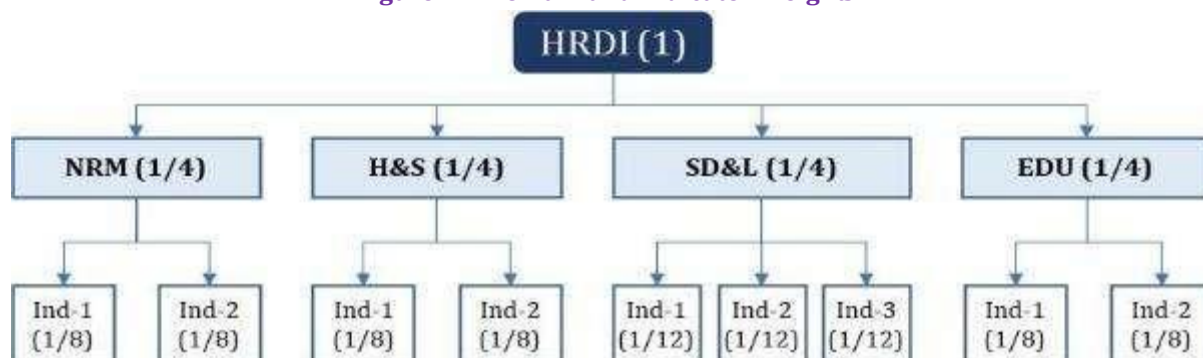
The outcome indicators included in the HRDI were obtained from different domains and are consequently measured on different scales. Therefore, to ensure the comparability of these indicators, all the indicators were converted into discrete variables such that the indicators could be measured between 0 and 1. Indicators such as productivity and income which were measured on a continuous scale were converted to discrete variables by setting a cut-off. The 50th percentile of these indicators at baseline was chosen as the cut-off point. Thus, a change in the indicator could be captured by recording the proportion of beneficiaries above the cut-off at two distinct points in time.

Indicator Weights

Weights were applied to each of these indicators, in similar lines with the HRDI calculation. Attribution of equal weights to all the domains were done in order to create a standard HRDI for each cluster.

Equal weights were assigned to each of the four domains. Further, the domain weight was equally distributed among the indicators of that domain; thereby ensuring that equal weightage of the domains was maintained overall.

Figure 21: Domain and Indicator Weights¹²



The example above is indicative. The domains as well as indicators were different across all projects, and hence the weights were changed slightly for the purpose of the study, following the principle stated above.

Table 13: Example of HRDI Calculation

| Project X | | |
|------------------------------------|--|------------------------------|
| Natural Resource Management | The proportion of farmers with net income above median | $(1/4) \times (1/2) = 0.125$ |
| | Percentage of farmers reporting access to irrigation | $(1/4) \times (1/2) = 0.125$ |
| Health and Sanitation | Percentage of households with access to improved drinking water facility | $(1/4) \times (1/3) = 0.083$ |
| | Percentage of households with access to improved toilet facility | $(1/4) \times (1/3) = 0.083$ |
| | Percentage of households with individual bathing unit | $(1/4) \times (1/3) = 0.083$ |
| | Percentage of SHG members reporting their groups having savings | $(1/4) \times (1/2) = 0.125$ |
| Livelihoods | Percentage of households with improved skills in Agriculture | $(1/4) \times (1/2) = 0.125$ |

¹² NRM: Natural Resource Management | H&S: Health and Sanitation | SD&L: Skill Development and Livelihoods | EDU: Education

| | | |
|------------------------------|---|------------------------------|
| and Skill development | Percentage of students reporting increased access to functional learning infrastructure (library, smart class, BaLA, etc.) | $(1/4) \times (1/2) = 0.125$ |
| Education | Percentage of students reporting increased access to functional school physical infrastructure (handwash station, separate washrooms, etc.) | $(1/4) \times (1/2) = 0.125$ |

Once all the indicators were standardized and weighted, a sum of these weighted indicators was utilized to calculate the value of HRDI.

Analysis Plan

HRDI for each cluster/ NGO was calculated at two points in time i.e., before and after HRDP and can be compared cross-sectionally to understand which domains contributed to an increase or decrease in HRDI value. Concurrently, the NGOs can be ranked according to the HRDI score based on their performance across different domains, but care should be taken as the project context varies for each area. Since the value attribution of the indicators is in proportions, the HRDI value numerically ranges between 0 and 1. Once all the indicators were standardized and weighted, a sum of these weighted indicators was utilized to calculate the value of HRDI.

Method to Calculate HRDI

Step 1: All the indicators were cleaned and adjusted for outliers. Only those beneficiaries were considered for the analysis where data on outcome indicators was available for both pre- and post-intervention.

Step 2: A cut-off value was calculated by taking the 50th percentile for each indicator before HRDP (baseline). For instance, consider the indicator- average annual income of farmers, at baseline, then sorted all the farmers across the seven clusters in ascending order based on their income. The 50th percentile i.e., the median value of the income was taken. This median or 50th percentile was taken as the cut-off (baseline cut-off to be precise).

Step 3: Calculated the proportion of beneficiaries above the set cut-off value at the baseline for each indicator.

Step 4: Calculated the same at the end-line i.e., the proportion of beneficiaries above the baseline cut-off for each indicator.

Step 5: Multiplied each proportion of the indicators with the set indicator weights.

Step 6: Sum all the indicators (i.e., weighted sum) to calculate the HRDI value at baseline and end-line.

Step 7: Calculated the relative change in the HRDI value from baseline to end line.

Step 8: Ranked the clusters based on relative change brought about in the HRDI value i.e., the cluster that brought the maximum change in the HRDI value received the first rank.

Table 14: HRDI Calculation for Yavatmal

| Domain | Indicators | Baseline | HRDI | End line | HRDI |
|--------|--|----------|------|----------|------|
| NRM | Proportion of farmers with net income above median | 0.16 | 0.11 | 0.22 | 0.15 |
| | Proportion of farmers reporting increased productivity of three main crops above median (before and after) | 0.08 | | 0.14 | |
| | Percentage of farmers reporting access to | 0.09 | | 0.10 | |

| Domain | Indicators | Baseline | HRDI | End line | HRDI |
|--------|--|----------|------|----------|------|
| | irrigation | | | | |
| ST&LE | Percentage of SHG members reporting income above median from rural enterprises | 0.07 | | 0.29 | |
| | Percentage of households who getting skill training and reporting increase in income from job/enterprise/self-employment | 0.06 | 0.09 | 0.32 | 0.27 |
| | Percentage of HH reporting income above median from livestock | 0.15 | | 0.20 | |
| H&S | Percentage of households reporting increase in use of fruits/vegetables from the nutrition garden | .. | | .. | |
| | Percentage of households reporting increase availability of drinking water facility | .. | .. | .. | .. |
| | Percentage of households with access to improved toilet facility | .. | | .. | |
| EDU | Percentage of respondents reporting increased access to functional school physical infrastructure (drinking water posts, separate washrooms, furniture etc.) | 0.06 | 0.06 | 0.46 | 0.28 |
| | Percentage of respondents reporting increased access to functional learning infrastructure (library, science labs, smart class, etc.) | 0.11 | | 0.38 | |
| | Total | | 0.26 | | 0.70 |

C Overview of Impact Calculation

The impact assessment process of SIED involves evaluating the effects of various activities. This evaluation is centred around quantifiable output indicators. Impact of each indicator is gauged by calculating the average proportion of beneficiaries associated with it. The overall impact level of an activity on beneficiaries is then determined by the degree of change in these output indicators. The impact levels are categorized into three tiers according to a predetermined scale:

Low: 0% - 40% change

Medium: >40% - 70% change

High: >70% - 100% change

Overview of Impact in the effectiveness section was calculated based on the averages of quantitative output indicators as demonstrated below.

| Outputs | Output Indicators | | Output Avg. | Impact Level |
|--|--|-----|-------------|--------------|
| Increased income from agriculture | | | | |
| Land/ crop productivity | Proportion of farmers reporting increase in production of crops that were supported under HRDP | 79% | 72% | High |
| | Proportion of farmers reporting increased input efficiency after the intervention | 68% | | |

| Outputs | Output Indicators | | Output Avg. | Impact Level |
|---|--|------|-------------|--------------|
| | Proportion of farmers reporting increased income from crops that were supported under HRDP. | 96% | | |
| | Average increase in income from crops that were supported under HRDP. | 44% | | |
| Access to farm management infrastructure | Proportion of beneficiaries satisfied with quality of available services | 74% | 43% | Medium |
| | Proportion of farmers that are able to access farm machinery | .. | | |
| | Proportion of farmers that accessed input support | 12% | | |
| Increased adoption of crop diversification | Proportion of farmers diversified their crops? | 51% | 30% | Low |
| | Proportion of farmers who adopted horticulture | 9% | | |
| Land under irrigation | Increased area under irrigation | 86% | 86% | High |
| Increased use of clean energy solutions | | | | |
| Adoption of clean energy infrastructure | Proportion of HHs using clean energy infrastructure | 100% | 100% | High |
| | Proportion of households reporting benefits from using clean energy infrastructure | 99% | | |
| Improved access to agricultural training and services | | | | |
| Access to Agriculture training and services | Proportion of farmers who accessed project training services | 53% | 52% | Medium |
| | Proportion of farmers who demonstrate awareness regarding sustainable farming practices | 50% | | |
| Adoption of improved farming practices | Proportion of farmers who adopt scientific agricultural practices | 51% | 62% | Medium |
| | Proportion of beneficiaries reporting increase in productivity due to better farm management | 46% | | |
| | Proportion of farmers reporting increased income | 89% | | |
| Economic empowerment through collectivization (Only for SHG members) | | | | |
| Formation/ revival of SHG based Enterprises | Proportion of members who received support with establishing/reviving SHGs | 63% | 77% | High |
| | Proportion of members who received support with establishing/reviving SHG enterprises | 71% | | |
| | Proportion of members whose SHGs are currently functioning | 97% | | |
| Development of entrepreneurship | Proportion of SHG members who received training | 94% | 71% | High |
| | Proportion of SHGs undertaking entrepreneurial activities | 75% | | |
| | Proportion of SHGs continuing SHG enterprise activities post project | 18% | | |
| | Proportion of SHGs with increased savings | 92% | | |
| | Proportion of SHG members reporting improved income | 78% | | |
| Enhanced capacity for regular income generation | | | | |
| Enhanced employable | Percentage of youth who accessed skill | 100% | 100% | High |

| Outputs | Output Indicators | | Output Avg. | Impact Level |
|--|--|------|-------------|--------------|
| skill development | development training | | | |
| | Percentage of youth who report improved employability | .. | | |
| Access to self-employment and entrepreneurial opportunities | Proportion of beneficiaries who established/ expanded entrepreneurial activities | 26% | 59% | Medium |
| | Proportion of beneficiaries reporting improved capacity to undertake entrepreneurial activities | 60% | | |
| | Proportion of beneficiary HHs reporting increase in income | 90% | | |
| Improved health infrastructure and services | | | | |
| Establishment/ enhancement of health infrastructure and services | Proportion of beneficiaries who gained access to health services | 79% | 61% | Medium |
| | Proportion of beneficiaries reporting lifestyle changes due to improved access | 43% | | |
| Improved quality of health services | Increase in no. of beneficiaries satisfied with quality of available services | .. | | |
| Access to affordable health services | Decrease in average annual HH health expenditure due to better health condition | 31% | 31% | Low |
| Improved sanitation infrastructure and services | | | | |
| Establishment/ enhancement of sanitation infrastructure. | Proportion of beneficiaries who gained access to sanitation services | 100% | 100% | High |
| | Increase in no of HHs with access to community sanitation infrastructure facilities at | .. | | |
| | Proportion of beneficiaries reporting benefits due to improved access | .. | | |
| | Increase in no of sanitation services available- | .. | | |
| Improved awareness and health seeking behaviour | | | | |
| Awareness regarding health and sanitation practices | Improved dietary practices/ reduced tobacco consumption/ improved physical exercise | 45% | 45% | Medium |
| | Improved awareness regarding sanitation practices | | | |
| | Improved awareness regarding waste management | | | |
| Adoption of positive health and sanitation practices | Increase in no of HHs demonstrating adoption of WASH practices | .. | | |
| | Increase in no. of HHs adopting proper solid waste management practices | | | |
| | Increase in no of HHs adopting proper liquid waste management practices | | | |
| Improved capacity of educational institutions to provide services | | | | |
| Access to improved physical infrastructure | Proportion of students/schools who gained access to functioning smart class rooms/ BaLA/science labs/libraries/learning aid/furniture/sports equipment | 72% | 82% | High |
| | Proportion of schools who gained access to clean and functioning sanitation units/drinking water posts at education institutions | 92% | | |

| Outputs | Output Indicators | | Output Avg. | Impact Level |
|---|--|------|-------------|--------------|
| Improvements in quality of teaching | Proportion of teachers regularly utilising smart class rooms and other learning aids (including BaLA) | 73% | 68% | Medium |
| | Proportion of students who prefer smart class rooms for lessons | 100% | | |
| | Proportion of parents/students/teachers who report improvements in teaching quality | .. | | |
| | Proportion of students/teachers who regularly utilize science labs/ libraries/other infra | 69% | | |
| | Proportion of teachers reporting improved capacity to adopt innovative teaching methods | 30% | | |
| | Awareness among teachers regarding child development | .. | | |
| Improved willingness to engage in school activities | Improvements in attendance due to improved infrastructure | 96% | 90% | High |
| | Proportion of institutions reporting increase in enrolment post infrastructure development | 76% | | |
| | Proportion of institutions reporting improved interest of students to engage in classroom activities | 99% | | |
| Improved learning outcomes | | | | |
| Improved exam performance and subject confidence among students | Proportion of students who gained access to coaching classes | .. | 72% | High |
| | Proportion of students who report improvements in exam performance for various subjects | 73% | | |
| | Proportion of students reporting increase in confidence in various subjects | .. | | |
| | Proportion of students who received scholarships | .. | | |
| | Proportion of teachers reporting improvements in learning outcomes due to infrastructural facilities at institutions (concept retention, attention span, and exam performance) | 71% | | |

| Change | Impact Level |
|------------|--------------|
| 0%-40% | Low |
| >40% - 70% | Medium |
| >70%- 100% | High |

D Two Sample Proportions Z Test

The two-sample proportions z-test is a statistical hypothesis test used to determine whether two proportions are different from each other. The null hypothesis of the test is that the two proportions are equal, while the alternative hypothesis is that the two proportions are not equal.

The test statistic for the two-sample proportions z-test is given by the following formula:

$$z = (p_1 - p_2) / \sqrt{p(1-p) / (n_1 + n_2)}$$

where:

p_1 is the proportion in the first sample

p_2 is the proportion in the second sample

p is the pooled proportion, calculated as $(p_1n_1 + p_2n_2) / (n_1 + n_2)$

n_1 is the sample size of the first sample

n_2 is the sample size of the second sample

The z-statistic is then compared to the standard normal distribution to determine the p-value of the test. A p-value less than alpha (typically 0.05) indicates that the null hypothesis can be rejected, and there is evidence to suggest that the two proportions are different.

The two-sample proportions z-test can be used to test for a difference in proportions between two groups of people, such as men and women, or two different brands of products. The test can also be used to compare the proportions of two different populations, such as the population of a city and the population of a state.

Here are some of the assumptions of the two-sample proportions z-test:

- The two samples are independent.
- The two populations are normally distributed.
- The sample sizes are large enough ($n_1p_1n_2p_2 > 10$) (Basically the Central Limit theorem should apply for the sampling distribution of the z-statistic can be approximated by the standard normal distribution.)

If these assumptions are not met, the results of the test may not be reliable.

The two-sample proportions z-test is a powerful tool for comparing two proportions. However, it is important to be aware of the assumptions of the test and to ensure that the data meets these assumptions before using the test.

Assumptions:

- Independence: The two samples must be independent of each other.
- Normality: The two populations must be normally distributed, or the sample sizes must be large enough ($n_1p_1n_2p_2 > 10$).
- Binomial distribution: The population does not need to follow a binomial distribution, but the test is more powerful if it does.

The z-test conducted for one indicator- Proportion of farmers with average productivity of bajra above baseline median-is shown below.

Table 15: Z-test Conducted for P0306

| Indicator | Proportion of farmers with income from agriculture above baseline median |
|--|--|
| p1 (proportion of first sample-endline) | 108 |
| n1 (sample size of p1) | 160 |

| | |
|---|---|
| p2 (proportion of second sample-baseline) | 78 |
| n2 (sample size of p2) | 160 |
| p | 0.58125 |
| Calculation | 0.055158684 |
| z statistic | 5.438853429 |
| | Statistically significant at 95% confidence level |
| p-value for the z statistic | 0.00001 |

E Theme-wise Sustainability Matrix

The project support provided demonstrated the capability to continue even after the programme ended. Support of the project to sustain improved outcomes are demonstrated below:

| Support provided (Enter relevant activity categories) | Structures established | Technical Know-how | Usage | Maintenance |
|---|------------------------|--------------------|-------|-------------|
| NRM | | | | |
| Farm Management | ✓ | ✓ | ✓ | ✓ |
| Clean Energy | ✓ | ✓ | ✓ | ✓ |
| Skill Training and Livelihood Enhancement | | | | |
| Agriculture Training and Support | ✓ | ✓ | ✓ | ✓ |
| SHG-Based Women Empowerment | ✓ | ✓ | ✓ | ✓ |
| Skill Training | | ✓ | ✓ | |
| Health and Sanitation | | | | |
| Health | | ✓ | | |
| Sanitation | ✓ | ✓ | ✓ | ✓ |
| Promotion of Education | | | | |
| Educational Institutions Development | ✓ | ✓ | ✓ | ✓ |