Jal Sanrakshan Baseline Report

AMBA MUKHERJEE
RESEARCH, MONITORING, AND EVALUATION

CONTENTS

1. INTRODUCTION

Agriculture plays a vital role in the economy of Aurangabad district as more than 80 percent of the population is dependent on agriculture and its allied sector. The average landholding is 1.46 ha. The total number of farmers in the district is 9.16 lakhs, of which 47 percent and 31 percent are marginal farmers and small farmers, respectively.[i] Aurangabad district is spread over an area of 10.08 lakh ha, out of which the area under cultivation is 8.52 lakh ha. Groundwater played an essential role in agriculture. It is estimated that over 70 percent of India's food-grain production now comes from irrigated agriculture in which groundwater plays a dominant role.[ii] Aurangabad was marked as the lowest water availability in the reservoir of Maharashtra from the year 2012–2015.[iii] The erratic and lower rainfall caused the drought situation in Aurangabad. The severity of drought leads to water scarcity and depletion of groundwater. To manage the drought, it is very crucial to capture the rainwater through rainwater harvesting structures.

With this backdrop, S M Sehgal Foundation, along with DCB Bank Ltd., has initiated an augmenting groundwater project in two villages[1] of Aurangabad district, Maharashtra. The main objective of the project is to harvest rainwater and channel it into groundwater to improve the availability of water for agriculture and other purposes with the construction of nala bunds and recharge wells. The projects aim to improve access to water for irrigation and livestock to enhance crop and land productivity. The project is implemented in three phases: pre-implementation, implementation, and post-implementation.[2] The post-implementation stage is essential to ensure the sustainability of the project; therefore, community-based village leadership schools (VLS) are developed. The members of VLS are integral parts of the project to ensure the sustainability of the project post-implementation.

2. OBJECTIVE

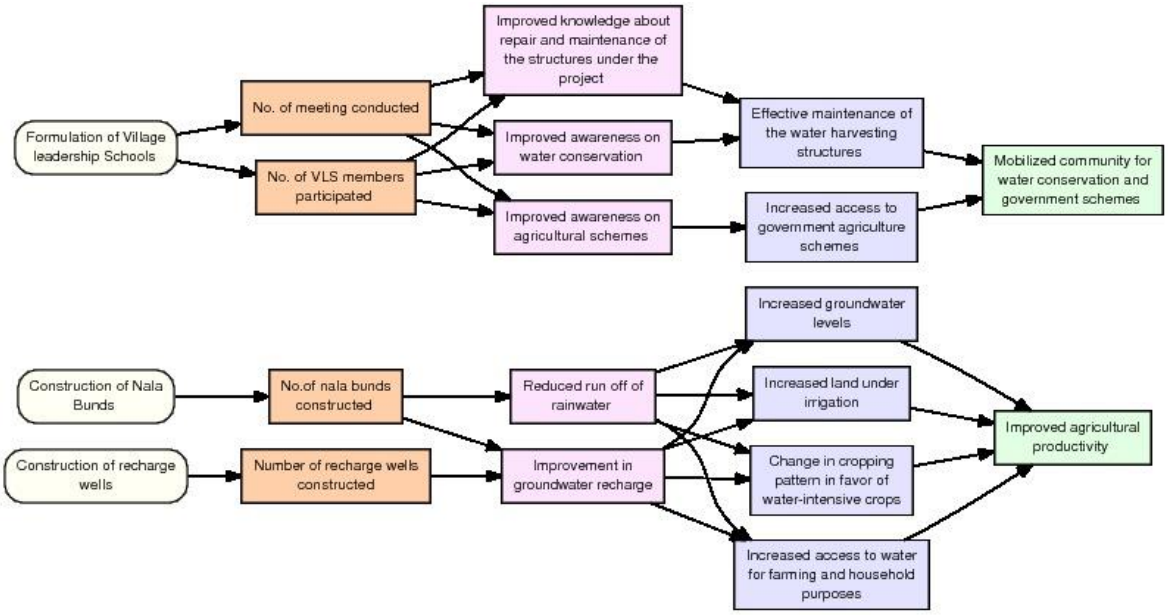
The current baseline study aims to understand the existing social, economic, and governance dynamics in the intervention area. The information is collected on critical variables like drinking water situation, groundwater level, agricultural practices, awareness, and implementation status of government schemes. All the collected data would help to understand the current situation of selected variables before the project implementation. Additionally, baseline information plays a significant role to map changes after project completion.

[1]Wawna and Nidhona.

[2]In pre implementation stage, SMSF staff visited the villages, interacted with the villagers, and had discussions about water and governance schemes. They also selected nala bund sites and the beneficiaries and members of VLS. Implementation stage dealt with all activities covered during the implementation of the project.

3. METHODOLOGY

3.1 LOG FRAME



3.2 SAMPLING

In the study, a sampling was done separately for nala bund and governance schemes. In terms of nala bund, there were three check dam sites and one recharge zone (site no. 5 and 6)[3]. The nala bund sites were selected by convenient sampling.[4] All the selected beneficiaries for each nala bund site were selected on fulfilment of the criteria that their field should fall within one kilometer from each site and recharge zone. The sample size of beneficiary farmers for each site was varied.

Furthermore, to scientifically measure the impact of the construction of check dam years later, farmers from the non-intervention region were selected. Farmers from the non-intervention region were selected based on three criteria: (1) farmland more than five kilometers from each check dam site; (2) must be a resident of non-intervention village; (3) have similar cropping pattern. For the sample size of control farmers, 50 percent of the beneficiary farmers were targeted for each site. In the governance section, all members of the village leadership school (VLS) were covered along with the eligible beneficiaries of the schemes from the nala bund sample. To covered Ayushman Bharat Yojana (ABY), all samples of nala bunds were covered. The structured, coded interview schedule was employed under the quantitative method for the components of nala bund sites, VLS, and governance schemes. Three governance schemes were included: Sukanya Samriddhi Yojana (SSY), Pradhan Mantri kisan Samman NidhiYojana (PM-KISAN), Ayushman Bharat Yojana (ABY).

[3]Three exclusive sites (site no. 1,4 and 7) and one recharge zone (site no.5 and 6) were selected under this study. Site no. 5 and 6 were considered as one recharge zone.

[4]Out of the seven nala bunds, sites of five were finalized before the data collection.

Table 1. Sample Size

Activity	Intervention Region	Non-intervention Region
Check dam	85	43
VLS	60	NA
SSY	40	20
PM-KISAN	59	30
ABY	84	42

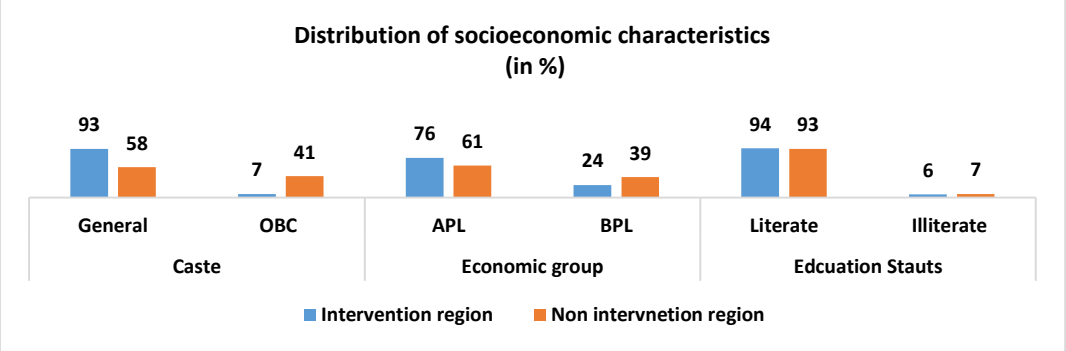
4. FINDINGS

The prime objective of the project was to improve the groundwater situation in two villages, Wawna and Nidhona of Aurangabad District, by constructing nala bunds and recharge wells. The dependence on groundwater for irrigation in this region at the time of the baseline was high. With the construction of nala bunds, the groundwater situation is expected to improve in the project area through increasing the area under irrigation. The availability of water could boost remuneration from farming by increasing the harvest cycles. The project also aims to improve the governance scenario of these two villages by capacity building with members of village leadership schools for the operation and maintenance of structures and to impart knowledge about key government programs. The findings of the baseline are divided into two sections: water and governance.

4.1 WATER

4.1.1 Socioeconomic dynamics

Socioeconomic characteristics are crucial to develop an understanding of a region. This section represents selected socioeconomic parameters that were essential in the project context. Hindu was the predominant religion in the area as 100 percent of residents in the intervention villages and 85 percent in non-intervention villages were Hindu. The rest were Muslim. The caste structure was represented by general and other backward caste (OBC). In intervention villages, 93 percent households were general caste and 7 percent were OBC. In comparison, in non-intervention region, there was a slightly higher percentage of general caste (58 percent) over OBC (41 percent). The economic status reflected that a sizeable population in intervention villages (76 percent) and non-intervention village (61 percent) holds Above-Poverty-Line cards (APL). The rest of the population had Below Poverty Line cards. The majority of the households were dependent on farming as their prime occupation.

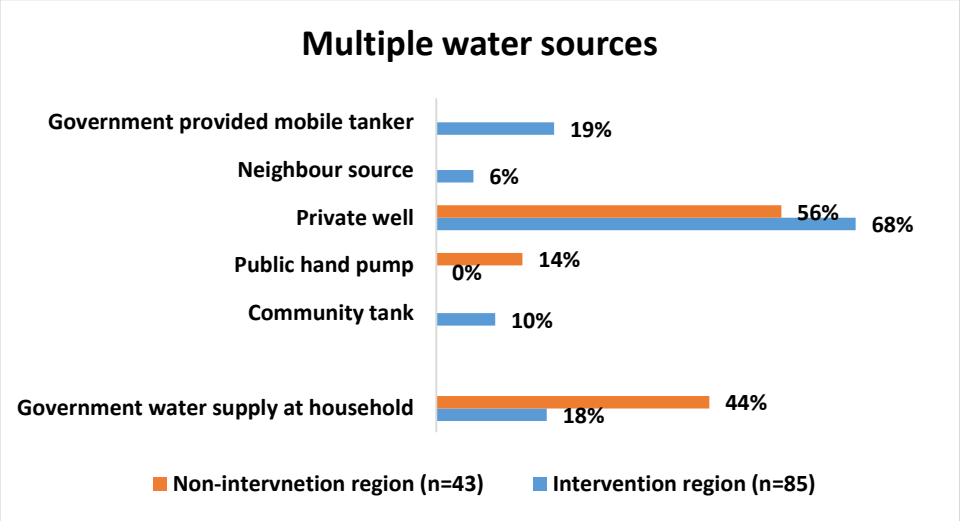


Graph 1. Socioeconomic characteristic

4.1.2 Water Dynamics

4.1.2.1 Drinking water

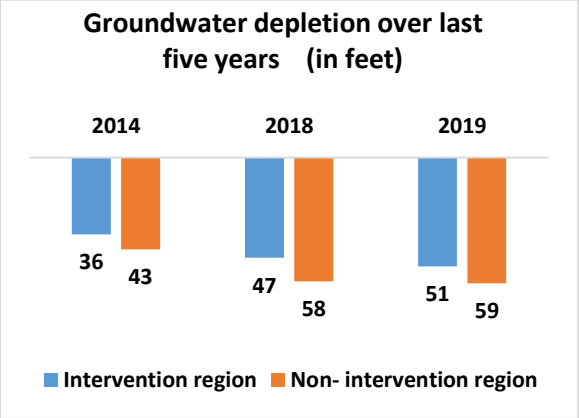
Drinking water is a basic need for human beings. Being the intervention region is in a water-scarce state, providing drinking water is a government responsibility. In the intervention region, it was found that there are multiple sources of drinking water as one single source was not sufficient to fulfil the water requirements throughout the year. In general, the water requirement was fulfilled mostly by personal open wells and government-supplied water at household levels. A sizeable percentage of households in the intervention village (56 percent) and non-intervention village (49 percent) depended on personal open wells. In the acute summer, government-supplied water was not supplied or erratically supplied for three to four weeks. During this period, the government provided mobile water tankers. All these tanks were available free of cost as the gram panchayat provided it. The majority of the households had access to drinking water sources within their household premises (intervention villages=80 percent; non-intervention village=100 percent). There were a few families who live on their farmland, and they were dependent on their open well for drinking water. These households didn't have government-supplied water because they resided outside the villages. Those households who do not have water sources within the household premises carried water from a distance ranging from 100–1,000 meters. There were multiple ways to bring water from the sources. Mostly women carried water on their heads. People used the same water sources for livestock in both villages.



Graph 2. Water sources in the study area

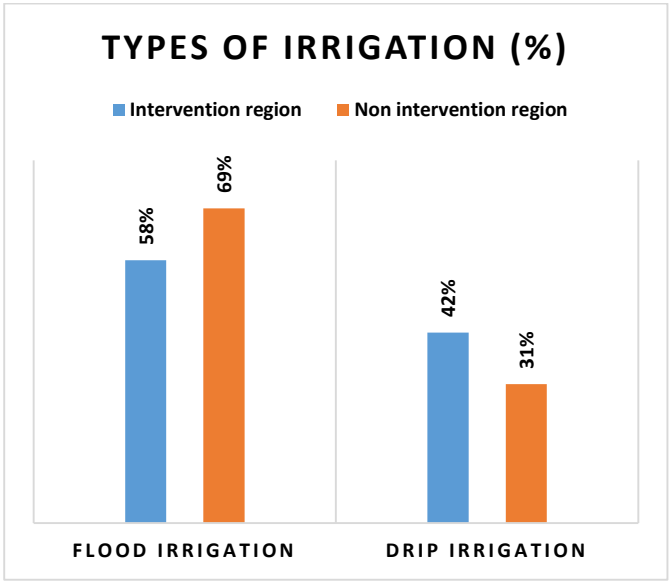
4.1.2.2 Water for irrigation

Groundwater is the primary source of irrigation in the intervention area. As Graph 3 depicts, over the years, there has been a continuous depletion of groundwater. In general, farmers (more than 60 percent) cited less rainfall, followed by 17 percent who cited groundwater extraction sources as the main reasons for the depletion of groundwater. The continuous reduction of groundwater is a severe issue for the region because open wells were the prime source of irrigation as well as drinking water purposes. The households who were shifted to the field were not dependent on their wells for drinking, livestock, and household chores.



Graph 3. Groundwater depletion

Open well was the primary source of irrigation. In the intervention region, 91 percent of farmers had open wells, whereas in non-intervention region, 81 percent of farmers owned open wells. The finding revealed that less than 40 percent of open wells were owned by single households. The remaining open wells had multiple ownership from one to seven households. As there was already a practice of water sharing from a single source by multiple families, no water trade was taking place in the region. In general, 4 percent of farmers had no irrigation sources and were entirely dependent on rain-fed agriculture. In terms of types of irrigation, flood and drip irrigation were found in this region. Flood irrigation was prevalent in the area and practiced by 58 percent, while 69 percent of farmers used the same in the non-intervention region. In the intervention region, 42 percent of farmers used drip irrigation, whereas in the non-intervention area, it was used by 31 percent of farmers.



Graph 4, Irrigation types

One interesting finding was that many farmers who shifted to their farm from the village were dependent on their private wells for drinking purposes. As a result, they stopped irrigating their crops once the water level dropped in their well. This was a common phenomenon across the region. Each farmer was aware when they have to stop irrigation and reserve the water for drinking. Clearly, drinking water was their priority over the production of their crops.

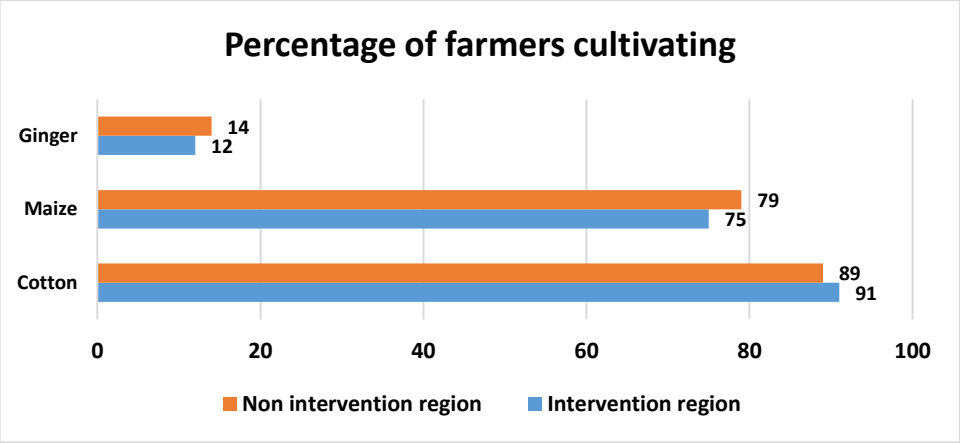
4.1.3 Agriculture practices

The land is the main asset of a farmer. Through this asset, the farmer has to meet all the needs of their household and livestock, as well as bear the agricultural expenses. Similarly, in the study area, farmers were dependent on the land as their main occupation of the region was agriculture. Although most of the farmers were reliant on a single harvest. In the intervention region, farmers were cultivating the net sown area (NSA) of 373 acres, while non-intervention farmers were cultivating 155 acres of land. The data (see Table 2) revealed that irrigated land accounted for more than 80 percent in both regions; still, only around 5 percent of farmers were able to take a second harvesting last year. The average landholding size was 4.3 acres in the intervention region and 3.5 acres in non-intervention village.

Table 2. Land Details

Land	Intervention region	Non-intervention region
Net Sown Area (acres)	373.36	154.70
Irrigate land (acres)	332.86	131.70
Non-irrigated land (acres)	40.50	23.00

The major crops grown in the studied area are cotton and maize. Generally, farmers were depended on the kharif crops. The dependency on rabi crops was minimal among farmers in both regions. Maize was also grown in rabi season by a few farmers (less than 5 percent). Cotton cultivated as a cash crop depended on rain or limited irrigation. The unavailability water for irrigation was one of the main reasons for less diversification of the crops in the studied area. Ginger plantation was also found in the area (intervention region=12 percent and non-intervention=14 percent). It was cultivated only by those farmers who have a drip and own irrigation sources.



Graph 5. Crop cultivated in the region

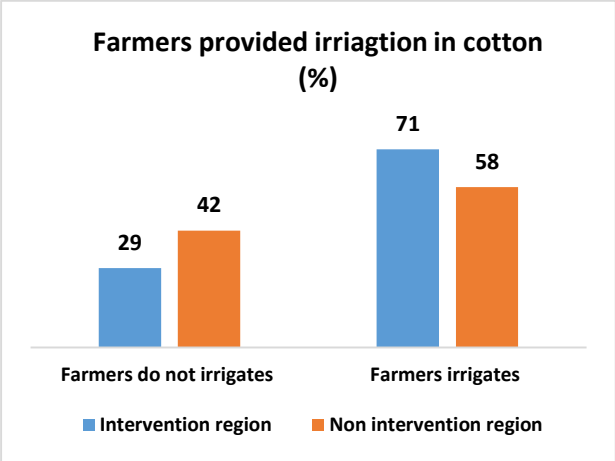
In the last harvest season, cotton and maize were cultivated by more than four-fifths of the respondents. Cotton (40 percent) captured a maximum share of NSA followed by maize (30 percent). Cotton and maize together occupied more than 70 percent of the land. Ginger was cultivated on less than 10 percent of the land. Cotton was growing for commercial purposes. Maize and ginger were cultivated for both commercial and subsistence purposes.

Table 3. Land under cultivation of major crops

	Intervention region farmers			Non-intervention region farmers		
	Cotton	Maize	Ginger	Cotton	Maize	Ginger
N	77	64	10	38	34	6
Percentage of farmers cultivating	91	75	12	88	79	14
Area under cultivation (acres)	151.5	115.3	8.75	76.45	61.75	6.5
Area under cultivation (as percentage of NSA)	39.62	30.15	2.29	49.42	39.92	4.20

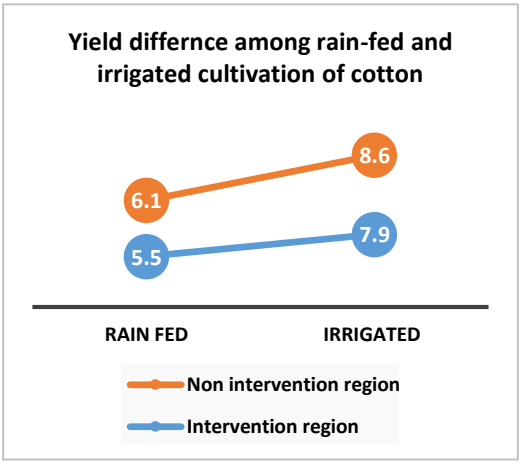
Cotton

Maharashtra is the largest cotton-growing state in the country. Cotton is the most widely grown commercial crop in the intervention area. As the graph depicts, in the intervention region, 91 percent and 88 percent of farmers in non-intervention region cultivated cotton in the last kharif season. Generally, framers used seed at a rate of 1 kg/acre for cotton. The findings revealed that a sizeable portion of the farmers were unable to irrigate the crop. In the intervention region, the irrigation frequency ranges from one round to eight rounds while in non-intervention region, it was one to five rounds).[5]The average yield of cotton was 7.9 quintals/acre in the intervention region, whereas the non-intervention region reported 8.6 quintals/acre for the same.[6]



[5]The irrigation cycles were dependent on water availability in their wells and type of irrigations. In flood irrigation, rounds of irrigation were low whereas in drip/drip irrigation rounds of irrigation were high.
[6]There were two types soil; one is black soil where the cotton yield ranges from 10–25 quintals/acres while in mumard soil which low in productive in nature which yield range lie between 5–10 quintals/acre. 15 farmers had a yield ranges from 1–4 quintals due to poor soil quality (sandy), field slope and diseases.

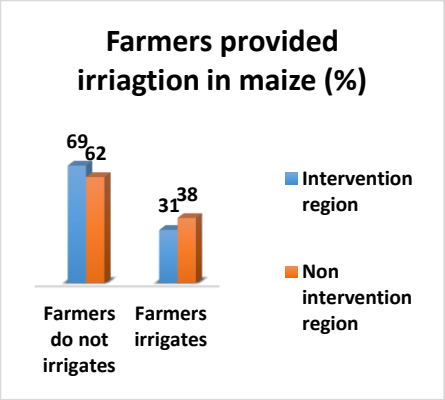
The yield of cotton was higher than the district yield, which was around 6.3 quintals/acre. Graph 6 illustrates that irrigation played an essential role in higher productivity. Farmers who irrigated their cotton had a higher yield of more than two quintals per acre in comparison with farmers who did not irrigate. The average cost of cultivating cotton in the one-acre plot was found to be more than INR 5,000.

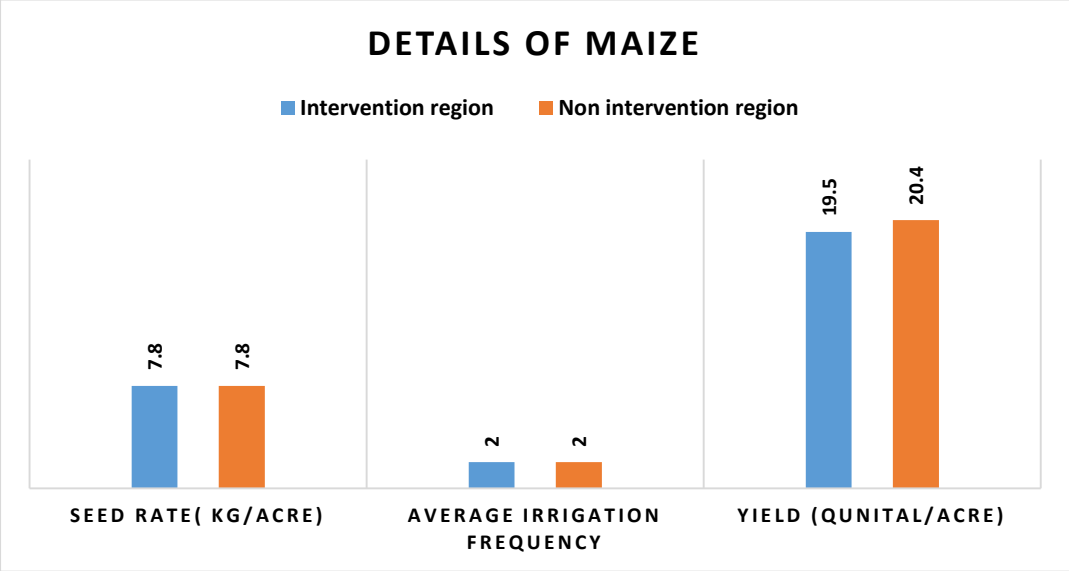


Graph 6. Yield (Quintals per acre) of cotton with and without irrigation

Maize

Maize[7] is the second primary crop in this region as more than 70 percent farmers growing it. The dependency on maize is high in this area because most farmers are dependent on a single harvest. After cotton, maize was mainly cultivated by the farmers. The maize is grown in rabi and kharif season. However, the rabi season maize was dependent on water availability. A few farmers who have water to irrigate grow maize in the rabi season. In general, the average rate seed rate for maize was 8kg/acre. In terms of irrigation, most of the farmers (above 60 percent) depend on rainwater. In the intervention region, one to five rounds of irrigation were applied to maize while in non-intervention region, one or two rounds of irrigation were provided.

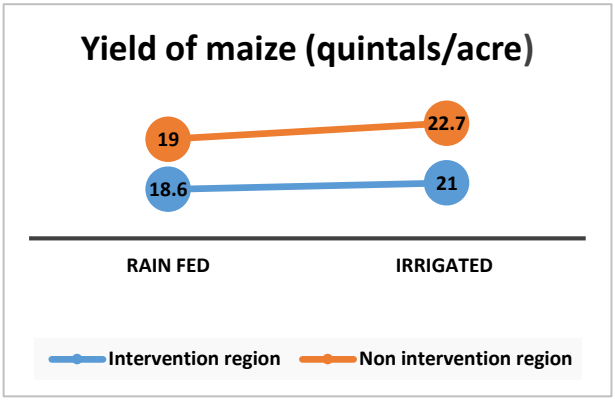




Graph 7. Details of maize

[7]Maize was grown in both rabi and kharif session. The details of maize capture for the entire year.

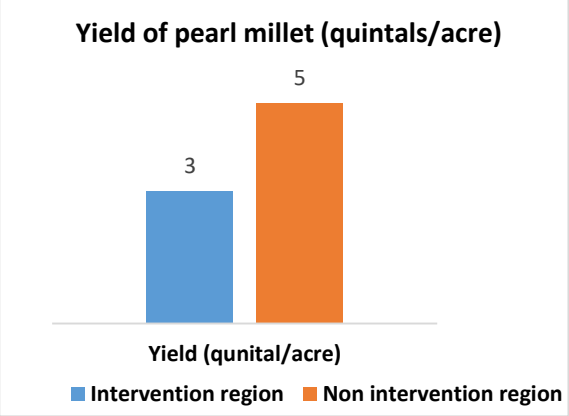
The yield was measured in three-dimension; yield, rain-fed yield, and third was irrigated yield. It was found that the average yield of maize was 19.5 quintals/acre in the intervention region and 20 quintals/acre in non-intervention region.[8] In both areas, the return was higher than the state yield, which was 13 quintals/acre.[9][iv] Findings revealed that more than two quintals yield difference were found between rain-fed and irrigated cultivation of maize. From this it could be inferred that irrigation is a big boost for higher productivity in this region.



Graph 8. Yield (quintals/acre) of maize with and without irrigation

Pearl Millet

As above discussed, most of the farmers were dependent on a single harvest. Pearl millet was a rain-fed crop. Two farmers out of the total studied sample were cultivating pearl millet. The average seed for pearl millet was 1.5kg/acre. The average yield in the intervention region was three quintals per acre, whereas in the non-intervention region was five quintals per acre.



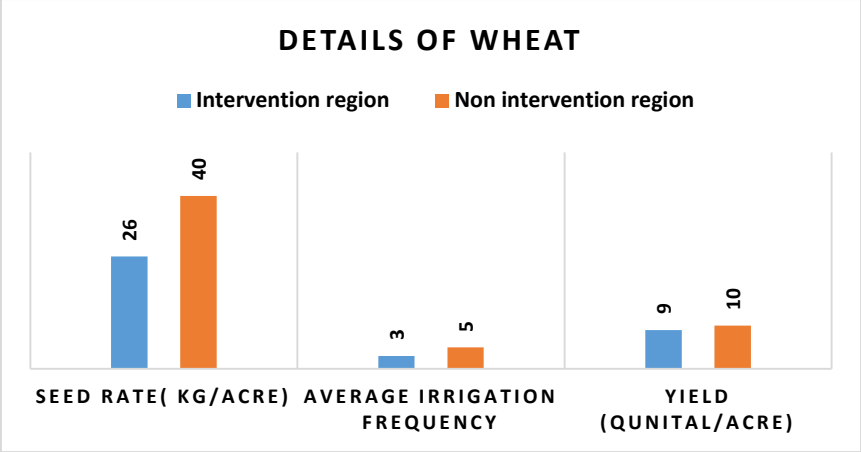
Graph 9. Yield of maize (quintals/acre)

Wheat

In terms of irrigation sources, more than 80 percent of farmers have irrigation sources with single or multiple ownership. But the irony was that only 4 percent of farmers were able to cultivate wheat in the past harvest season. For wheat, the average seed rate was 40kg/acre. On average, four cycles of irrigation were provided for wheat. The average yield was 9 quintals/acre in intervention villages and 10 quintals/acre in non-intervention village.

[8]There were two types soil; one is black soil where the maize yield ranges from 20–40 quintals/acres; while mumard soil is less productive in nature and yield range lies between 10–20 quintals/acre. Nine farmers had a yield ranges from 4–9 quintals due to poor soil quality (sandy) and field slopes (less moisture). There were nine farmers who had a yield more than 25 quintals/acre due to black soil.

[9] The availability of black soil and good yield was the reason for higher yield.



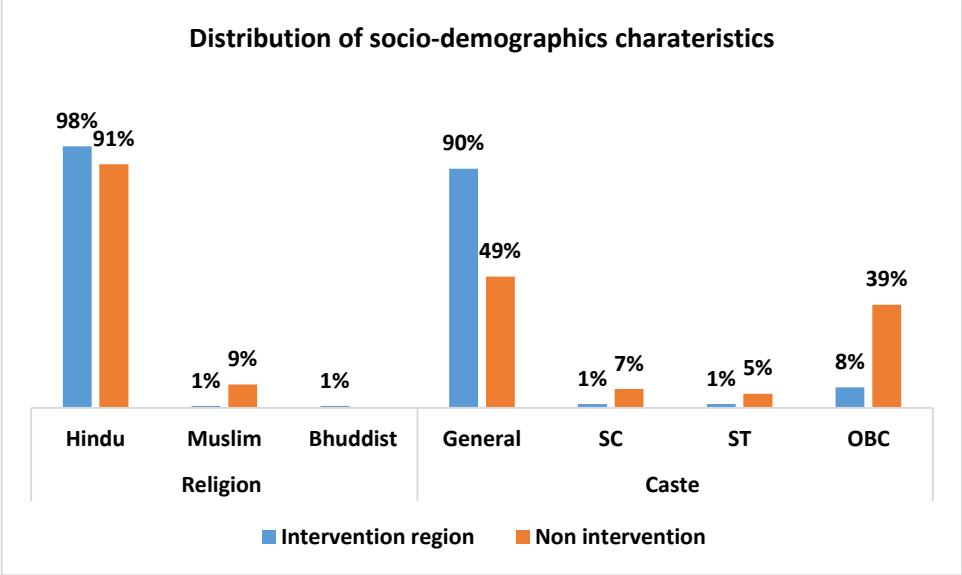
Graph 10. Seed rate, irrigation, and yield of wheat

Ginger

Farmers were also growing ginger for commercial purposes. The ginger plantation requires a lot of water. Therefore, ginger was produced only by the farmers who have irrigation sources and drip systems, i.e., 12 percent. The harvest period of ginger is not fixed; it can be harvested just after six months of sowing to two years. It was sowed in June and harvested around December. The average seed rate for ginger was around 850 kg/acre. The average irrigation ranges from 12–15 per acre by drip. The average yield was 47 quintals/acre in intervention and non-intervention region.

4.2 Governance Status of government schemes

Governance is an important platform through which a maximum number of people should be addressed under a single project. In this project, governance is as vital as a maximum number of villagers were covered under various government welfare schemes, which would help them to access their stipulated entitlement. In the intervention region, it is found that Hindu was the main religion, followed by Muslim and Buddhist. Like the other states of India, households were mostly headed by a male. All four castes, i.e. general, OBC, SC, and ST, were found in the studied region with a dominance of general caste. In the intervention area, 73 percent of households had APL cards while in non-intervention area, 61 percent had the same. The rest of the houses fell under the BPL category. The average family size was seven.



Graph 11. **Distribution of socio demography**

The main objective of the welfare scheme is to help the most vulnerable communities across the country. But it is found that the benefits of these welfare schemes mostly do not reach to rural areas of the country. Therefore, the S M Sehgal Foundation team decided to provide awareness and hand-holding supports to eligible candidates for the three schemes: Sukanya Samriddhi Yojana (SSY), Pradhan Mantri kisan Samman Nidhi Yojana (PMKNY), and Ayushman Bharat Yojana (ABY). The purpose of creating awareness was to increase the accessibility of these schemes by providing capacity building and training of VLS members in the intervention region. In this section, we tried to capture the awareness of these schemes among the members of VLS and villagers before the implementation of the project.

4.2.1. Sukanya Samriddhi Yojana (SSY)

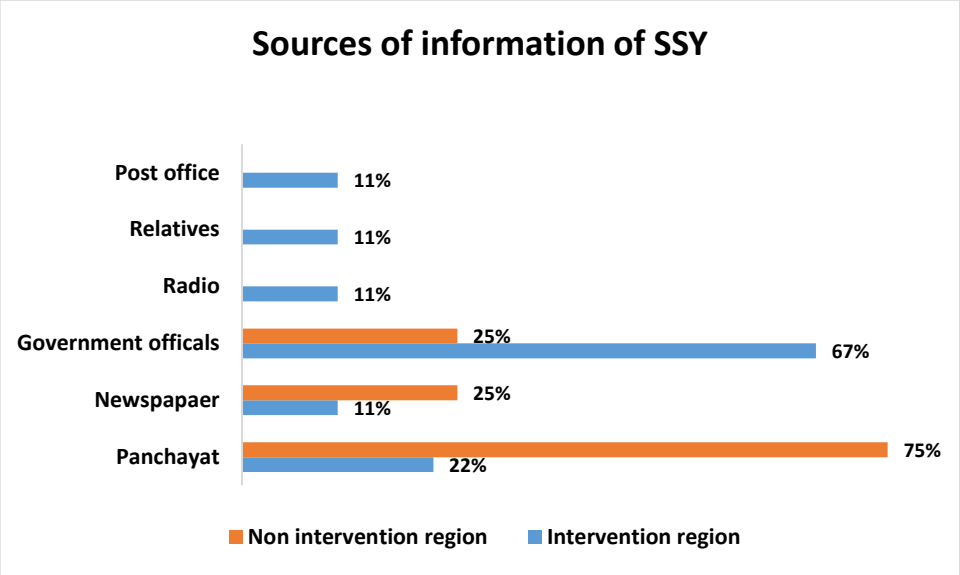
The prime minister launched Sukanya Samridhi Yojana (SSY) on 22 January 2015 as part of the Beti Bachao, Beti Padhao campaign. The scheme encourages parents to build a fund for future education and marriage expenses for their female children. Besides, it promotes parents to invest in their daughters' future by offering them good interest rate. This small saving scheme can be opened in post offices and designated private and public banks in the form of a savings account in the name of the baby girl. The interest rate is declared quarterly, just like other post office schemes. The interest rate for Jan-Mar'19 (Q4, FY 2018–19) was 8.5 percent.

4.2.1.1 Awareness level

To avail any welfare schemes, awareness plays a vital role; without awareness, there is low possibility to avail benefits. The awareness level about SSY was low in the intervention area. In the intervention region, 25 percent of the respondents were aware about SSY, whereas 10 percent respondent in non-intervention region were aware of the same. Among the Village-Level School committee members, 60 percent were aware about SSY.

It is found that saving practices for daughters were low in the sample villages (intervention region=18 percent and non-Intervention=10 percent). All of them saved money in the post office. In general, more than 50 percent of respondents who were saving money reported that the saved money would be used for the daughter's marriage. In the intervention region, the rest of respondents (50 percent) highlighted the saved money can apply to the daughter's education. In contrast, respondents from non-intervention said they could use the savings in case of emergency. Households who were not saving (intervention region=72 percent and non-intervention region=90 percent) money for their daughters reported that

they don't have economically feasible conditions to save money. A sizeable percentage of families of intervention region (97 percent) and non-intervention (95 percent) had no money for saving. However, the rest of the sample didn't feel the need for saving money for a daughter. Those who were aware about SSY received their information from various sources. In the intervention region, the highest information about SSY was shared by government officials, but in non-intervention, the source was the panchayat. The Graph 12 below depicts various information sources of SSY. Out of the aware respondents, 56 percent of the intervention region and 50 percent of the non-intervention region availed the facilities of SSY. Under the SSY, beneficiaries deposited money ranges of INR 2,400–12,000.



Graph 12. Information sources of SSY

4.2.2. Pradhan Mantri kisan Samman Nidhi Yojana (PM-KISAN)

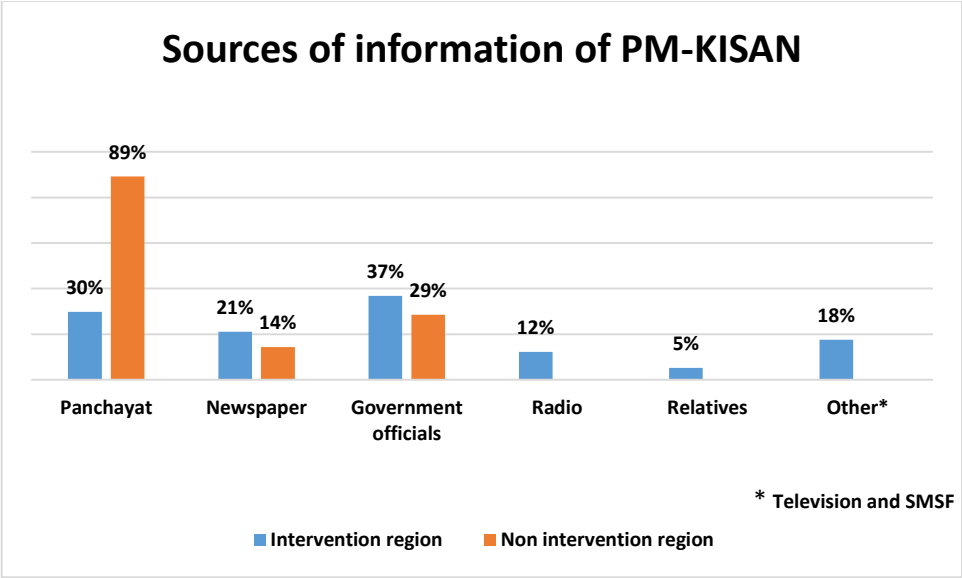
In India, the condition of farmers is fragile in terms of income because their income is totally dependent on the climatic condition. The current unfavorable climatic condition is a normal phenomenon. In the studied area, the findings showed that farmers were not able to cultivate rabi harvest due to inadequate water. As a result, they don't have money to buy inputs for the next kharif harvest. Consequently, they take loans from moneylenders/banks. To stop this practice and support small and marginal farmers, Pradhan Mantri Kisan Samman NidhiYojana (PM-KISAN) was launched by the government of India. This initiative was started in 2019 to provide support for around 120 million small and marginal farmers who have less than 2 hectares (4.9 acres) of landholding. They will get up to ₹6,000 per year as minimum income support.[v] The PM-KISAN scheme aims to supplement the financial needs of these farmers in purchasing various inputs to ensure proper crop health and appropriate yields commensurate with the anticipated farm income at the end of each crop cycle. It would also protect them from falling in the clutches of moneylenders to meet such expenses and further ensures their continuance in farming activities.

4.2.2.1 Awareness level

The awareness level about PM-KISAN was good in the studied area. The level of awareness was higher by 44 percent in non-intervention village than the intervention region (intervention region= 36 percent and non-intervention region=80 percent)[10]. The aware farmers reported that they were aware of the scheme from the year 2018 and 2019. However, the awareness level among VLS members was low (28

[10] The awareness level in non-intervention region was high due to panchayat activeness.

percent). In general, people were aware about eligible criteria and benefits under the scheme. In the intervention region, out of the aware respondents 70 percent knew who can apply for the scheme, while in non-intervention villages, almost everyone was aware about the same. It was interesting to highlight that in the intervention region, the percentage of beneficiaries who avail the benefits was higher than the non-intervention villages (intervention region=26 percent, and non-intervention village=13 percent). The money availed was ranging from INR 2,000–6,000.



Graph 13. Information sources of PM-KISAN

4.2.3. Ayushman Bharat Yojana (ABY)

Health is one of the most essential aspects for creating balanced social, economic, and environmental sustainability. In India, most of the population belongs to low and middle-income groups. Around 22 percent of the population is categorized as below the poverty line, and spending on health is a heavy burden on them. To meet target 3 under SDGs in 2018, the GoI announced a mammoth health program known as Ayushman Bharat Yojana (ABY), which is widely propagated as a step toward universal health coverage. It covers expenses up to INR 5,00,000 for a family under these categories: hospitalization, day surgeries, follow-up care, pre- and post-hospitalization expense benefits, and services for new born children. The scheme is aimed at providing insurance coverage to economically backward people in rural and urban areas who will be identified on the basis of data from the Socio-Economic Caste Census (SECC) 2011. The coverage will be Rs 5 lakh per family per year.

4.2.3.1. Awareness level

In general, the awareness level of ABY was shallow among the villagers and VLS members. In the intervention region, only 7 percent were aware about ABY, while in the non-intervention region, 9 percent were aware about the same. Only 8 percent of VLS members were aware about the ABY in the studied area. The information was shared by various sources like panchayats in mobile and MLA meetings. All the aware households knew about the objective of ABY; however, none of them were

informed about eligibility criteria to avail the schemes. In the intervention region, one percent of families received an Ayushman Bharat Card.

5. CONCLUSION

The findings of the study concluded that the intervention region was a water-stressed area. Due to water scarcity, irrigation was affected as a consequence of farmers being mostly dependent on rain-fed agriculture. The farmers were finding it difficult to cultivate more than one crop in a year; and even if they cultivate, most of the crop is rain-fed or has limited irrigation. The region regularly witnesses groundwater depletion due to erratic rainfall and drought conditions. Many farmers stop the irrigation at peak time irrigation to reserve water for drinking purposes for themselves and their livestock. More than 60 percent had irrigation sources on a shared basis. Sharing water resources when there is a low level of groundwater enables farmers to have adequate irrigation for their crops. Apart from the agriculture problem, the avail of the government schemes was limited in the intervention area. In a scheme like PM-KISAN, even people who were aware were still not able to avail of the benefits. In a nutshell, activities under the project would lead to better water availability for irrigation and other activities. Consequently, increasing the irrigation frequency will increase the agricultural yield and return from the same. Additionally, awareness generation and hand-holding support to villagers by VLS members has the potential to enhance the availing of the government schemes (PM-KISAN, SSY, and ABY).

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[i] See http://www.mgmkvk.com/about_district.php.

[ii] Gandhi, V. P., and Bhamoriya, V. (2011). Groundwater irrigation in India: growth, challenges, and risks, Indian infrastructure report water: policy and performance for sustainable development.

[iii] See https://www.2030wrg.org/wp-content/uploads/2015/10/2030-WRG_Maharashtra-Hydro-Economic-Analysis_June15.pdf.

[iv] Source: Ministry of Agriculture and Farmers Welfare, Govt. of India. (ON1704).

[v] See https://pmkisan.gov.in/Documents/PMKisanSamanNidhi.PDF.