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Nienkerke, Inga Mareike; Thorat, Amit; Patt, Anthony

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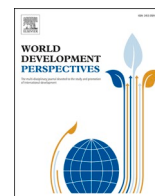
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From distress migration to selective migration: Transformative effects of agricultural development on seasonal migration

Inga Mareike Nienkerke^{a,*}, Amit Thorat^b, Anthony Patt^c

^a Department of Environmental Systems Science, ETH Zürich, Universitaetstrasse 22, CHN J 76.1, 8092 Zürich, Switzerland

^b Center for the Study of Regional Development, Jawaharlal Nehru University, New Delhi, India

^c Department of Environmental Systems Science, ETH Zürich, Switzerland

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ABSTRACT

Mostly for survival rather than wellbeing or profit, seasonal migration is a deeply entrenched but burdensome coping strategy among the rural poor who face seasonal livelihood insecurity, trapping many in a vicious cycle of chronic poverty and seasonal migration. Can rural agricultural development programs effectively transform these livelihoods and places of seasonal migration?

Following a mixed-methods approach, including a survey of 1,860 randomly sampled households in the states of Rajasthan, Gujarat, Maharashtra, and Karnataka in India, we assess the potential of the Wadi program, which supports integrated farming systems, to boost the farmers' agricultural productivity and to change their deeply entrenched but burdensome coping strategy of seasonal migration. When comparing participants of the program with non-participants, we find a significant reduction in the intensity and frequency of seasonal migration, as well as spillover effects – that is, not only the participants but also whole villages profit from an enhanced local economy. We further analyze the general challenges and migration pattern of seasonal migrants, including the factors that play a role in the decision to seasonally migrate. We find that it is crucial to change the reasons underlying seasonal migration in order to enable the development from *distress* to *selective migration*. This study's results imply the benefits to be gained from scaling up the Wadi concept and provide evidence of its positive impacts as a contribution to the science–policy dialogue about development programs.



* Corresponding author.

E-mail addresses: inga.nienkerke@usys.ethz.ch (I.M. Nienkerke), anthony.patt@usys.ethz.ch (A. Patt).

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Video 1.



1. Introduction

In 2020, for the first time, the socially invisible and politically silent floating population of Indian seasonal migrants tragically made it to the headlines of newspapers worldwide. Surprised by the COVID-19 lockdown, they were stranded and had no choice but to walk hundreds of kilometers home to their villages. Without warning, their workplaces, such as factories or construction sites, where they were living and working in hand-to-mouth, inhumane conditions, were closed, abruptly leaving them without access to money or food. Some died on the way to their distant homes (Shreehari, 2021). This tragedy finally drew public attention to the widely neglected importance of temporary migration and to the meager livelihoods of poor rural households in India, which some scholars had already noted previously (Breman, 1996; Rogaly, 1998; Haberfeld et al., 1999; de Haan, 1999; Banerjee & Duflo, 2007; Tacoli, 2009; Sucharita & Rout, 2019). It also gave momentum to the question of how to tackle the misery of leading a precarious life in a vicious cycle of chronic poverty and seasonal migration.

1.1. Motivation

Some economic theories treat seasonal migration as an effective coping strategy or a rational investment decision when the overall expected benefits exceed the costs involved. In this case, seasonal migration is a coping mechanism for those who cannot sustain their lives in their local Indian villages throughout the year; however, it is mostly for survival rather than wellbeing or profit and exacerbates the poverty trap. At their work destinations, many live in the open or in temporary shelters in unhealthy surroundings, without access to safe drinking water, sanitation, electricity, or affordable food. Structures of oppression are reproduced through labor-contracting arrangements at the destinations and may even be more exploitative than the officially forbidden caste-based oppression (Mosse et al., 2002; Olsen & Ram-anamurthy, 2000). Seasonal migrants usually work on construction sites, cotton and sugarcane farms, in saltpans, stone quarries, or brick-making kilns –occupations known for low wages and harsh working conditions.

Many reports and ethnographic studies describe the status quo, but rigorous scientific assessments of potential solutions are scarce or nonexistent. This research gap motivated us to conduct our empirical study and to ask our main research question: Can rural agricultural development programs be effective enough to change the deeply

entrenched but burdensome coping strategy of seasonal migration? Following a mixed-methods approach, including a survey of 1,860 randomly sampled households in Rajasthan, Gujarat, Maharashtra, and Karnataka, regions with high seasonal migration rates, we assessed the Wadi program, which supports integrated farming practices through water resource development and orchards. Foreshadowing our results, when comparing participants of the Wadi program with non-participants, we found a significant reduction in the intensity and frequency of seasonal migration, as well as evidence of spillover effects – that is, not only the participants but whole villages profited. With the lack of long-term success stories and the persistent skepticism toward supporting and funding rural agricultural projects (DIME, 2021), there is an urgent need for evidence of possible success. This study contributes to filling this gap by highlighting a way to help farmers escape from the vicious cycle of chronic poverty and seasonal migration.

1.2. Drivers and challenges of seasonal migration

In India, as well as other places, many smallholder farmers practice rain-fed agriculture, which is possible only for a short period of time after the monsoon season. With the farmers' inability to survive on their meager harvest and in the absence of more effective risk-management instruments, their only available coping strategy is seasonal migration. These brief migrations often occur under exploitative conditions, with the farmers returning home shortly before the next growing season and having saved next to nothing. Often, earnings from migration are used to repay debts incurred at home, as well as in the destination areas, resulting in conditions of neobondage (Srivastava, 2009) and further cementing the vicious cycle of chronic poverty and seasonal migration. The state of being trapped in poverty is referred to as chronic poverty (Mehta & Shah, 2003) and intergenerational poverty (Asadullah & Yalonzky, 2012). 'Substantial intergenerational persistence' of poverty has been found, particularly in the cases of low-skilled and low-paying occupations, across generations in rural and urban India by comparing the socioeconomic conditions of the sons with those of their fathers (Motiram & Singh, 2012). In fact, the quest for household security often locks poor people into social structures that reduce their vulnerability but also keep them poor (Hulme, 2003).

As the most common coping livelihood strategy adopted by the rural poor to adapt to seasonal food insecurity (Sucharita & Rout, 2019), without alternatives, internal migration will persist and increase substantially (Rogaly, 1998; Mosse et al., 2005; Deshingkar & Start, 2003;

Keshri & Bhagat, 2012; Nayyar & Kim, 2018). Information on the real magnitude of seasonal migration is mostly limited by the national surveys' inability to 'catch' the floating population, which therefore remains statistically invisible. Estimates vary, ranging from 20 % of the workforce in India (Anupama et al., 2016) to more than a quarter of the nation's population of over one billion (Graeme, 2014; Srivastava, 2012) to 30–100 million (Deshingkar & Akter, 2009). The only established facts are that the numbers will rise and that the situation is not improving.

It appears that nothing has changed in the situation of the current seasonal migrants compared with that of past generations, when examining the literature from different decades. Selected case studies from regions overlapping with those in which our survey was carried out illustrate this point. For example, in their early case studies, Breman (1996) and Haberfeld et al. (1999) found that a large fraction of households relied on earnings from their migrant labor as a compensating mechanism for their disadvantageous position. Mosse et al. (2002) describe how long-term debt and systems of usurious money lending, labor contracting, and exploitation keep migrants in a trap where they migrate the most, work hardest, and still hardly save anything. Coffey (2013) and Roy et al. (2015) explore the difficult circumstances and educational sacrifice faced by children of seasonal migrants; these authors stress that the migrant community will remain deprived of educational opportunities and be stuck in a vicious cycle of poverty, migration, and illiteracy. In their recent case study, Visaria and Joshi (2021) report that sugarcane harvesters in Gujarat are trapped in poverty and indebtedness, living in temporary shelters under harsh conditions with the bare minimum necessities and amenities, earning less than half of the mandated minimum wage rate for agricultural laborers. Even if they were not 'bonded,' they had no choice, resources, skills, education, or other support to escape from going to work as sugarcane harvesters year after year and generation after generation (see also Breman, 2007, 2008). Jaleel and Chattopadhyay (2021) emphasize the distress-driven nature, inhumane circumstances, and significant negative consequences on health and children. Bhattacharjee (2021) report a high likelihood of health hazards owing to the harsh working conditions and scarcity of basic amenities. Shah and Lerche (2020) focus on migrant labor, exploitation, and inequalities as crucial for capitalist growth (see also Breman, 1996). They explain how racism/casteism and the spatial politics of internal colonialism work together to the disadvantage of migrants, who are ineligible for fundamental citizenship rights and welfare measures and are treated as second-class citizens – if citizens at all. The various issues described in these selected case studies are also reported in other literature and are in line with the findings from our own experiences/research.

Seasonal migrants comprise the real engine of growth in several sectors, providing a low-cost and flexible labor source. While the economy and society reap large profits, the workers remain without identity and benefits. Employers' and the government's responses to protect the livelihoods of these people are almost non-existent, as they are unwilling to subsidize the costs of migration through either appropriate labor and social policies or investments in basic needs and infrastructure for migrants (Jaleel & Chattopadhyay, 2021; Srivastava, 2012). Since 1979, the Interstate Migrant Workmen Act (ISMWA) has dealt with registrations of recruiters and migrant workers, licensing of contractors, details of wage rates, and journey and displacement allowances that workers should receive (Panda & Mishra, 2018). However, workers are usually unaware of their rights (Breman, 2010; Ministry of Housing and Urban Poverty Alleviation, 2017), and the government does little to nothing to implement them. Rather, the opposite is occurring, as the government is 'reforming' labor legislation, legalizing parts of existing illegal employment practices (Shah & Lerche, 2020). Moreover, seasonal workers have no bargaining power against corporate sector-operated industries or powerful lobbies, such as the sugar lobby, which succeeds in keeping wages low (Visaria & Joshi, 2021). In addition to the exploitation and deprivation of migrant

workers' rights, their collective action is prevented through isolation, discrimination, language barriers, debt bondage, and private security firms (Srivastava & Jha, 2016; Picherit, 2018). India's most significant education program Sarva Shiksha Abhiyan (SSA) tries to reach out to children migrating with their families but without much success as they are simply unable to attend school or take exams when on the move, especially in Rajasthan, Gujarat, and Maharashtra (Deshingkar & Sandi, 2012) – three of the four regions covered in our study.

1.3. Policies to address seasonal migration and the Wadi program

The above-mentioned ineffective policies and mostly failed relief efforts usually try to treat the symptoms (i.e., the migration conditions) and neglect the causes (i.e., the underlying reasons). While improved conditions would be important and migration could be empowering, taking into account the fact that India has hit a bottleneck in the creation of new jobs in the non-farm sector or in urban areas (Agrawal & Chandrasekhar, 2016), one wonders, "What could be a way out?" "Where will the good jobs come from?" (India's Economic Survey 2012–2013, Ministry of Finance, 2013). The mainstream view is that (besides the enforcement of labor laws and social protection,) solutions need to be provided in rural areas by addressing the symptoms and their underlying causes, that is, strengthening the livelihood base in these areas, creating employment and food security, and increasing the productivity of dryland agriculture (e.g., NABARD Indian Development Bank, Srivastava, 2012). Imbert and Papp (2020) suggested that a policy that would improve employment opportunities in rural areas might reduce migration from rural areas and could have large, far-reaching, spatial spillover effects. However, no rigorous scientific assessment of what could be a (permanent) solution exists so far. Anecdotal evidence is biased; while Mosse et al. (2002) did not find much success in projects promoting agriculture to curb migration, Visaria and Joshi (2021) briefly mentioned the successful cultivation of cashew nut trees in India under the Wadi program – the program that we rigorously assessed. It has been shown that this rural development program can boost income (Nienkerke & Patt, 2022), but does it also have an impact on decreasing seasonal migration?

Wadi means 'fruit orchard' in the Gujarati language, and the core of the program lies in helping families cultivate fruit trees and intercrops. Each family is typically provided with support over four years for the establishment of a Wadi on 1 acre (0.40 ha) of the so-called wasteland, which would not otherwise be used for rain-fed crop cultivation. Since these plantations are established on degraded lands in areas prone to soil erosion and water scarcity, soil and water conservation, as well as water resource development, are essential. These measures reduce drinking water scarcity and ensure an adequate supply of water for trees and crops, especially in the summer during the growth stage. Capacity building is also included as an integral part of the program, along with the development of cooperative community organizations to better cope with challenges in the sale of the agricultural products and to ensure appropriate prices. These activities, such as cashew processing and mango trading, create employment at the local level, also for landless people. Another crucial element is the initial financial support. Due to the relatively long gestation period of 3–5 years, during which no significant income is expected except from intercrops – provided that an irrigation facility is available – the program participants receive wages for working on their own Wadi. This enables them to take care of their Wadi, instead of opting for distress seasonal migration (for more details on the Wadi program, refer to Nienkerke & Patt, 2022).

2. Materials and methods

2.1. Control, intermediate, and treatment groups

The way that the Wadi program was implemented and its rules for selecting participants automatically produced a natural experiment. It

was implemented in a randomized rollout; more precisely, the program was gradually phased in geographically since the early 1990s, incorporating all interested beneficiaries in one village or region before moving to the next. It was introduced through village and hamlet meetings and exposure visits, and all households were given an equal opportunity to participate. This allowed a randomized evaluation design that would avoid selection bias, would provide good internal validity, and could rely on weaker assumptions compared with those of other methods (Gertler et al., 2016). Villages in the program area had the opportunity to join the program within a certain year, while villages outside of this area had to wait for their turn. Therefore, the villages and households that were located just outside the program area – and thus had no opportunity to participate at that time – served as control villages.

To assess not only the households but also the transformation/development of *places* (i.e., villages and hamlets) and possible spillover effects, we examined two different groups in the treatment villages – randomly sampled participating households *and* randomly sampled non-participating households – and compared those with places of persistent seasonal migration (i.e., control villages). The non-participants in program villages thus formed an intermediary group between the pure control and the pure treatment groups. If they would profit from the program, this would show that it generated spillover benefits, going beyond the group of participants. Fig. 1 visualizes the research design:

Participants: Randomly sampled participating households.

Non-participants in Wadi program villages: Randomly sampled households that did not participate in the program when it was rolled out in their village. Intermediary group between pure control and pure treatment groups to analyze spillover effects.

Households in control villages: Randomly sampled households in villages 5–20 km outside of the program areas, thus not having the opportunity to participate yet. The control villages were carefully selected in consultation with local experts and based on a list of criteria in order to match the program villages with regard to external factors.

2.2. Mixed methods

We followed a mixed-methods approach that started with qualitative evidence gathering, moved to quantitative evidence to be able to ascertain significant findings, and finished with additional qualitative evidence to deepen our understanding of the processes at work. The first step was *participatory rural appraisal*, including field visits, focus group discussions, and qualitative interviews with the participants, as well as non-participants, NGOs, local and international experts, ministers, teachers, health professionals, Indian Development Bank professionals, tribal institutes, and development agencies. Based on this, a *quantitative survey* was developed and conducted face-to-face in the four Indian states of Rajasthan, Maharashtra, Gujarat, and Karnataka, representing different geographic regions. Fig. 2 shows a map of the research areas. In addition to the main questions on several indicators, a set of questions addressed to the interviewer about how well the respondents understood the questions, a section on the geographical context, as well as an open question for remarks and collection of GPS data, provided validity

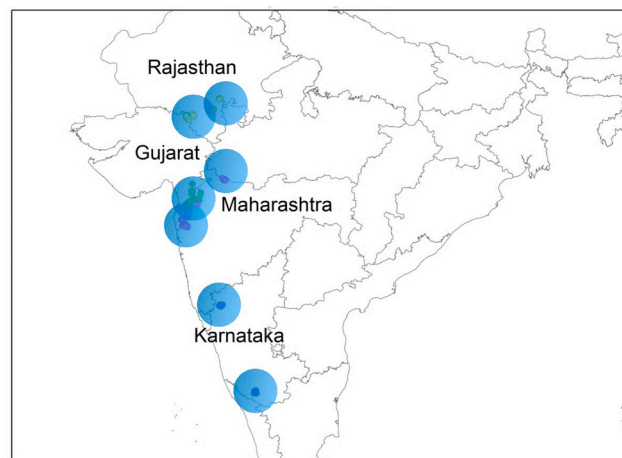


Fig. 2. Map of India, indicating the research areas.

and reliability checks and additional insights. After the survey, the interviewers in each state discussed and reported their personal experiences, impressions, challenges, and solutions. Throughout the research process, qualitative interviews with stakeholders or local experts were conducted whenever needed for verification or clarification.

2.3. Survey design and sampling

The survey was conducted with 1,860 randomly sampled households (1,132 participating households and 728 non-participating households). Detailed information was gathered from all members of the households, thus enabling analyses at both individual and household levels. The sample was randomly drawn from the population of all households that participated in the program in the four states, totaling 188,231. As a backup, an additional short list of randomly sampled households had been prepared for the rare cases in which the residents of a sampled household were nowhere to be found on two visits by the interviewer or did not give their consent to be interviewed. The questionnaire for this quantitative survey was rigorously tested in the field and translated in an iterative process. The interviewers were experienced and trained, knew the local context and dialect, and used ODK software (Hartung et al., 2010) on their smartphones. This direct digital input of data and mostly (closed) multiple-choice questions kept possible errors and data cleaning to a minimum.

In our analysis, we compared the three groups with respect to various parameters and conducted stepwise linear regressions.

3. Results

Our analysis considers three questions in sequence. First, can we gain deeper insights into the general challenges and migration pattern of seasonal migrants, including the factors that play a role in their decision to seasonally migrate? Second, can a rural agricultural development program – in this case, the Wadi program, reduce the intensity (months per year) and frequency (times per year) of seasonal migration? Third and finally, are there possible spillover effects? In particular, we evaluate the possibility of spillovers by examining non-participating households in program villages, which form an intermediary group in between our pure control and pure treatment groups.

3.1. Descriptive statistics of all households

The descriptive statistics table (Table 1) contains the key similarities and differences among the three groups. We find that almost all surveyed households prefer farming to seasonal migration for the same income. The groups are also very similar regarding age, remoteness,

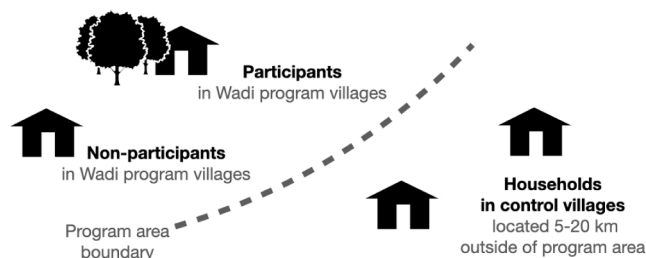


Fig. 1. Visualization of the research design.

Table 1
Descriptive statistics of all surveyed households per group¹.

	Households in CONTROL Group	Non-participating households in program villages	Households in TREATMENT group
Variables with similar values in all groups			
Preferring farming to migration for the same income (% of people)	94	89	96
Age (household average)	29	26	29
Familysize / number of people in household	5.9	4.9	5.3
Gender ratio (f/m)	48/52	50/50	48/52
Travel time to primary school in minutes	13	13	14
Travel time to secondary school in minutes	36	34	36
Walking distance to the nearest drinking water source in minutes	17	12	15
Own landholding in acres	2.8	2.5	3.2
Variables with different values in all groups			
Ever left for seasonal migration (% of people)	31	22	13
Seasonally migrated last year (% of people)	16	12	7
Seasonal migration: times per year (household average)	3	2	1
Seasonal migration: months per year (household average)	2.4	1.8	1
Seasonal migration: furthest destination (household average)	76	50	41
Seasonal migration: net income per household per year	19,000	10,000	10,000
Enough to eat during seasonal migration or not migrating (% of people)	52	77	85
Always enough to eat when staying at home (% of people)	56	72	85
Number of children who join IF the family seasonally migrates	1.4	1.1	1
Educational years completed under age of 18 (household average)	4.6	5	5.7
Years of education desired for girls	12	12	13

Table 1 (continued)

	Households in CONTROL Group	Non-participating households in program villages	Households in TREATMENT group
Number of income sources per household	6	6	8
Wealth in Rupees (including debt and savings)	34,000	33,000	65,000
Debt in Rupees	10,000	3,700	3,800
Farming income in Rupees per household per year	18,000	18,000	50,000
Irrigated land in acres	0.4	0.8	1.3
Cultivated land in acres	2.4	2.5	3.1
Cultivating kitchen garden, i.e. improved dietary diversity (% of households)	16	21	50
Adequate water availability (% of households)	67	85	91

¹ The exchange rate for Indian Rupees was: INR 80 for one Euro on 1. March 2018.

landholding, household size, and gender ratio. However, they have substantial differences in wealth, debt, number of income sources, area of cultivated and irrigated land, income from farming, and water availability. More households of the treatment group report having a kitchen garden and having always enough to eat when staying home, as well as during their seasonal migration. Members of the treatment group under 18 years old, on average, have completed one more year of education compared with the control group's members.

Fig. 3 shows that the households of the treatment group, on average, have lower values for all migration parameters, namely how many people migrated in the year preceding the survey, income from seasonal migration, months per year (intensity), farthest destination, longest duration, times per year (frequency), how many members of a household ever seasonally migrated, and debt. Debt is not necessarily but very likely linked to seasonal migration and therefore included in this figure (see section 1.2 Drivers and challenges of seasonal migration, for details on the debt trap of seasonal migrants).

3.2. Seasonal migrants, quantitative results

Next, we turn from the household level to focus on the people who seasonally migrated in the year preceding the survey. The descriptive statistics in Table 2 and Fig. 4 show that all migration parameter values of the treatment group are slightly lower than those of the control group, except income from seasonal migration, which is much higher for seasonal migrants in the treatment group than for those in the control group. The former group also shows higher/better values in educational matters and a preference for rural over urban destinations.

3.3. Seasonal migrants, qualitative results

In the focus group discussions with women from the villages in our research area, as well as in the qualitative interviews, seasonal migration and the typical pattern and challenges were thematized/addressed. The key aspects were similar across the families from the villages in the control group, as well as the families that became program participants but reported about their lives as seasonal migrants previously. Fig. 5 represents a typical example of the yearly migration pattern, in this case, a couple from Maharashtra. Each year, they leave their village in mid-

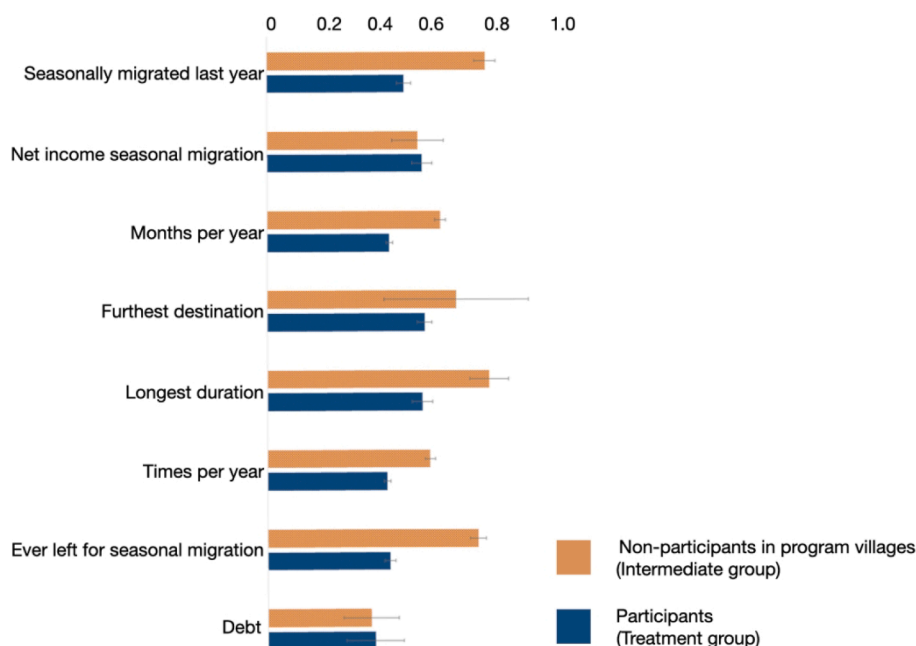


Fig. 3. Migration parameters, household averages. Ratio of average parameter values for the intermediate and treatment groups to those of the control group.

January to work in construction in Thane, where he earns 250 rupees (Rs) per day and she earns 200 Rs per day (2–3 euros). In all labor arrangements, it is common for women to earn less than men. Sometimes, they return home for a couple of days to celebrate the Holi festival, but in any case, they return home by the end of May for the monsoon season, which is from June to September. They plant and harvest rain-fed crops such as rice and millet for subsistence and stay until after the important Diwali festival, which – depending on the year – is held around the end of October/mid-November. By then, they run out of resources and leave to work as agricultural laborers until December at least. Depending on the year and the situation, they find more work or return home until the whole seasonal migration begins anew.

Typically, seasonal migrants take food, all cooking resources and fuel, wood, or kerosene along when they depart in search of labor. When they run out of these items, a family member goes back and gets resources again. They explain that food at the destination is too expensive and only in their home village can they buy subsidized rice with their ration card. Depending on the distance between their home village and possible work sites, they stay from a week to several months at the work location, and when they return to the village, they leave after a couple of days again. Many stay home for four months for monsoon crops; others “only go home when there is a festival.” The seasonal migrants all confirm that they do not migrate out of choice but out of distress because there is “no livelihood in the village (...); after harvesting (of monsoon crops), there is nothing to do other than migrating.” They say that the jobs vary but all are hard, low-skilled, and low-paying, such as cultivating onions, cutting grass, building dams, working in concrete construction, or carrying 15-kg headloads of sand or rice to load trucks. “Without doing hard work, we cannot fill our empty stomachs.” We also conducted interviews in the workplaces of seasonal migrants, as well as in the meeting places of seasonal migrants and people looking for workers. Most seasonal migrants arrive in groups, some with the whole family, including the elderly and children, carrying foodstuff and firewood. Usually, the groups select one person to negotiate with potential employers. In all cases, the wage earned is low, but what is eventually kept is even lower. To cite an example, “Even if we get 3,000 Rs, we cannot take home the full amount; 1,000 Rs is expended on fare, then 500 Rs for home expenses, 100 Rs for this (and that), and 500 Rs in the bank.” While the seasonal migrants talk about the exhausting work and poor conditions, the

employers usually speak highly of the workers: “I am confident that this work can be done skillfully only by these people because of the way that God has created them; their body structure, energy levels, stamina, and persistence are well suited to the job.” Another employer is enthusiastic about the extraordinary amenities that he provides to the agricultural laborers because they can sleep in a garage, which even has a light bulb.

The main three challenges associated with seasonal migration are (1) health and accommodations “because we have no money, we stay without shelter,” (2) food – “many times, we go hungry to work,” and (3) taking care of children, who “also work in the fields” or “stay with grandparents, but when they are too old or unable to take care of them, they have to come along, and this results in discontinuation of education,” or “they are home alone, so [there is] no one to pay attention if they go to school, take a bath or not.” Besides the impossibility to attend school when on the move, the migrant workers’ financial situation is stated as the main reason for school dropouts, as well as their lack of family support, lack of self-confidence, lack of an adequate learning environment, and discrimination. “For a village person, receiving education is similar to milking a lion; we have to deal with so many situations and hardships.” We find anecdotal evidence that when children stay home with their grandparents or other relatives, they also often do not attend school because their grandparents do not regard school as important and there are many other tasks to do. Sometimes, there is the option of a residential boarding school (Ashram school). This is a topic of its own, and we sum it up by daring to ask, “Who likes to send one’s young children to a not particularly child-friendly institution for up to eight months per year when the educational outcome is unclear?”

Program participants report that they previously migrated “to make both ends meet,” but they can now stay home, “take some rest, and earn good income from our land itself, instead of going to do labor work.” “We cultivate something or another all year round.” In many villages, none of the Wadi holders migrate anymore, whereas previously, almost the entire village left. For example, in a village with 336 residents, over 300 used to migrate. They explain, “Now, there is stability in life”; they can take care of their children the whole time and send them to school regularly. They have also increased their dietary diversity: “Now we have vegetables in our diet because we grow them in our farm. In the past, we used to eat them only when we got them, but now, they’re always available.”

Many people who did not participate in the Wadi program at that

Table 2
Descriptive statistics of people who migrated last year.

	Migrants in CONTROL Group	Non-participating people in program villages, who migrate	Migrants in TREATMENT Group
Variables with similar values in all groups			
Age (household average)	35	33	35
Gender ratio (f/m)	23/77	23/77	22/78
Seasonal migration within same state (vs. to other state)	80	89	80
Seasonal migration: times per year (household average)	4	3.9	3.6
Seasonal migration: months per year (household average)	3.6	3.4	3.1
Variables with different values in all groups			
Number of income sources per household	7	6	10
Own landholding in acres	2	2.2	3
Family size / number of people in household	6	5	7
Wealth in Rupees (including debt and savings)	56,000	38,000	99,000
Educational years completed under age of 18 (household average)	4	9	7
Ever attended school (% of people)	75	44	84
Currently enrolled in school (% of people)	0	0	38
Seasonally migrating to rural/urban destination (% of people)	40/53	46/52	56/42
Seasonal migration: net income per household per year	15,000	14,000	19,000

time (e.g., because of their skepticism) have later realized its importance and established Wadis at their own expense. "People have realized that even if they have (only) 10 mango trees and if they have proper fruiting for 4 months, then they can survive on this income for 4 months." Others planted an additional Wadi: "Obviously, we took up a new Wadi because we got benefits from the existing one." Wadi owners also report that unseasonal rainfalls have caused damage to rice and wheat, while trees have been unaffected.

3.4. Factors influencing the decision to seasonally migrate

What factors influence someone to stay or leave home for seasonal migration? In a stepwise linear regression analysis (see Table 3), we scrutinize which factors play a role in the (1) intensity (months per year) and (2) frequency (times per year) of seasonal migration. We find all

factors significant and the adjusted R-squared values to be 0.52 in (1) and 0.44 in (2). The overall models are significant, with $F(12, 833) = 78.70$ and $p < .001$ for (1) and $F(12, 833) = 53.92$ and $p < .001$ for (2). Debt, remoteness, and household size (number of family members) increase seasonal migration, while farming income, area of irrigated land, number of fruit trees, number of years of education of the person with the highest education in the household, average age in the household, and average years of education per household have negative impacts.

If farming income increases by 10,000 rs, this leads to 1 month less of migration per year. An increase of 1 acre of irrigated land results in 0.88 month less, while an increase in landholding by 1 acre results only in 0.2 month less. Education has an impact, as 1 more year of the average education level per household reduces migration by 0.12 month and 1 more year of education for the best-educated person in the household by 0.16 month less. One more person in the household leads to 0.49 month more of migration; if debt increases by 10,000 rs, the number of months spent migrating increases by 0.3. Remoteness, measured in travel time to primary school, increases migration months by 0.46 for every 10 min more of travel time.

In the variable comparison (Fig. 6), the beta coefficients show that the variables *farming income* and *family size* cause the largest changes in the number of months of seasonal migration per year.

Income from farming, area of irrigated land, and number of (fruit) trees are also correlated with many rural development efforts, so these results might indicate that programs such as the Wadi have the potential to reduce seasonal migration. We scrutinize this hypothesis in the following subsection.

3.5. Program impact on seasonal migration

The multiple linear regression analysis (see Table 4) shows a significant impact of program participation on the reduction of seasonal migration in both frequency (1) and intensity (2). The overall models are significant, with $F(9, 9336) = 307.5$ and $p < .001$ for (1) and $F(9, 9336) = 317.34$ and $p < .001$ for (2). The members of participating households leave home $b = -3.795$ ($p < .001$) times less for seasonal migration per year and are gone for seasonal migration $b = -3.815$ ($p < .001$) months less per year than the members of the households in the villages belonging to the control group. Household size and being male also have significant positive impacts on the intensity and frequency of seasonal migration, while larger landholdings result in less migration. Spillover effects are evident; even the non-participants in the villages covered by the program undertake significantly less seasonal migration: $b = -2.017$ ($p < .001$) times less and $b = -1.454$ ($p < .001$) months less than the households in the control group.

Furthermore, over 60 % of participating households report having at least one person (who used to migrate seasonally) staying home since treatment (i.e. joining the program). Of the participating households where someone is still migrating, 79 % report at least one person (who used to migrate seasonally) staying home since treatment. Seasonal migration also has a negative impact on life satisfaction ($b = -0.136$, $p < .001$), measured on a 5-point Likert scale. The spillover effect also becomes visible through the Wadi development of the non-participants without external support in the villages covered by the program ($b = -0.262$, $p < .001$). This is also reflected in Fig. 7; the non-participants in the villages covered by the program generate a larger share of their income from farming than from seasonal migration compared with the control group.

3.6. Distribution of income sources per group

The households in the treatment group earn more income overall, but the ratio/distribution of their income sources also differs from those of the other groups. While the households in the treatment group generate most of their income from farming, the households in the control group depend highly on seasonal migration. The non-

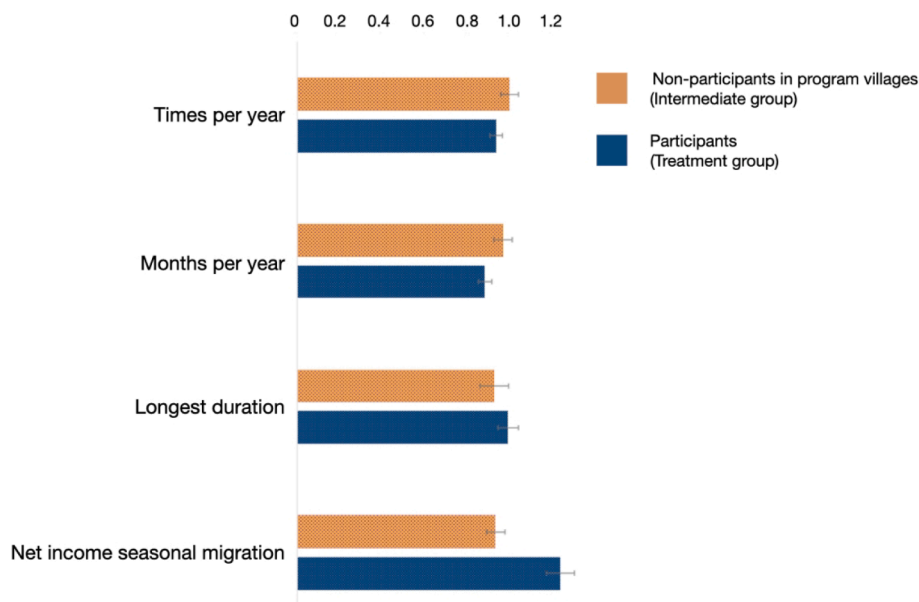


Fig. 4. Migration parameters of people who seasonally migrated last year. Ratio of average parameter values for the intermediate and treatment groups to those of the control group.

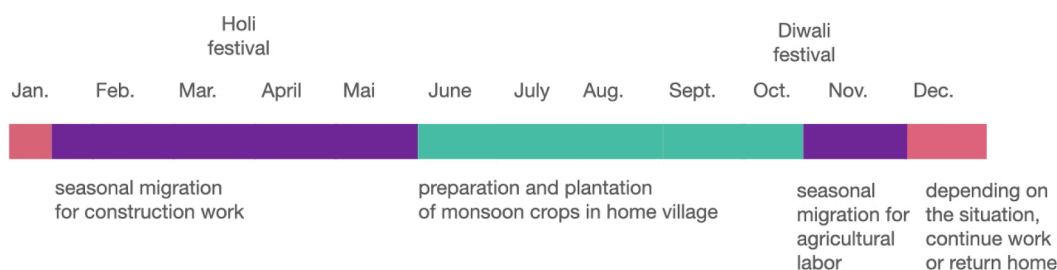


Fig. 5. Yearly migration pattern of a typical poor smallholder family from Maharashtra.

participants in the villages covered by the program earn a total income similar to that of the control group but undertake less seasonal migration and more farming.

4. Discussion

Can a rural development program enable marginalized, smallholder farmers in India to break away from a vicious cycle of chronic poverty and seasonal migration? The answer is yes. Previously, the families were forced to leave their villages every season, after the harvest of the *kharif* (summer/monsoon) crop, in search of labor. The program constitutes a fundamental change to their lives. Frequency (months per year) as well as intensity (times per year), duration per stay, distance to the destination, percentage of the people who migrated seasonally, and debt have been significantly reduced. Now, the participating farmers have an assured source of income from their Wadis and can stay in their villages throughout the year, while the farmers in the villages belonging to the control group still depend primarily on seasonal migration and rain-fed agriculture after the monsoon season, only returning occasionally to celebrate important festivities or to pick up foodstuff. It is clear that festivals and the associated care of social networks play a dominant role in the migration pattern, as seasonal migrants invest scarce resources in returning home to participate in such events. Farmers are attached to their home villages, even though these places cannot sustain their lives throughout the year. Given their overall low economic status, which they do not manage to improve with seasonal migration either, they take the opportunity to grow some rain-fed crops on their small landholdings

in order to contribute to their subsistence.

Generally and globally, migration and development studies view temporary internal labor migration with optimism, as it can contribute to poverty reduction and human development in low resource settings (e.g., Dodd et al., 2016). However, this is mostly not the case in India, where local realities include the presence of exploitative labor arrangements, a domestic policy environment that largely neglects migrant workers and their rights, and distress-induced migration trajectories where labor migration represents a necessity for household subsistence rather than a free choice (Deshingkar & Akter, 2009; Deshingkar & Start, 2003; Mosse et al., 2005; Rogaly et al., 2001). From the perspective of employers in need of unskilled labor, seasonal migrants comprise the perfect workforce. They are unskilled and can therefore be paid low wages, in desperate need of money and thus hardworking, and can be treated as if they do not have any rights and without consequences.

Seasonal migration is a complex phenomenon. The question of which factors influence the migration pattern and 'who migrates' has no simple answer as many factors play a role. We find that the household characteristics of the migrant decision maker, especially in the context of increasing agricultural returns, such as irrigation and the number of fruit trees, as well as income from farming itself, are more important than individual characteristics. Enhancing these factors in order to boost agricultural productivity and income is usually the objective of rural development programs.

In the Wadi program, its participants' ongoing presence has dramatically changed their relationship to their land. They now invest in

Table 3
Stepwise linear regression models of factors influencing seasonal migration (1) frequency (times/year) and (2) intensity (months/year) of seasonal migrants.

	Dependent variable:	
	Times/year (1)	Months/year (2)
Max.of educational years completed	-0.200*** (0.047)	-0.156*** (0.038)
Irrigated land	-0.496** (0.221)	-0.876*** (0.178)
Farming income	-0.0001*** (0.00001)	-0.0001*** (0.00001)
Debt	0.00003*** (0.00001)	0.00003*** (0.00001)
Age	-0.055*** (0.015)	-0.038*** (0.012)
Own landholding	-0.349*** (0.127)	-0.209** (0.102)
Education	-0.173*** (0.045)	-0.119*** (0.036)
Proxy for remoteness	0.037** (0.016)	0.046*** (0.013)
Householdsize	0.579*** (0.080)	0.486*** (0.064)
No. of fruit trees	-0.016** (0.007)	-0.023*** (0.006)
Wealth	0.0001*** (0.00000)	0.0001*** (0.00000)
Constant	6.759*** (0.887)	4.999*** (0.713)
Observations	846	846
R ²	0.437	0.531
Adjusted R ²	0.429	0.525
Residual Std. Error (df = 833)	4.945	3.974
F Statistic (df = 12; 833)	53.925***	78.704***

Note: *p<0.1; ** p<0.05; *** p<0.01

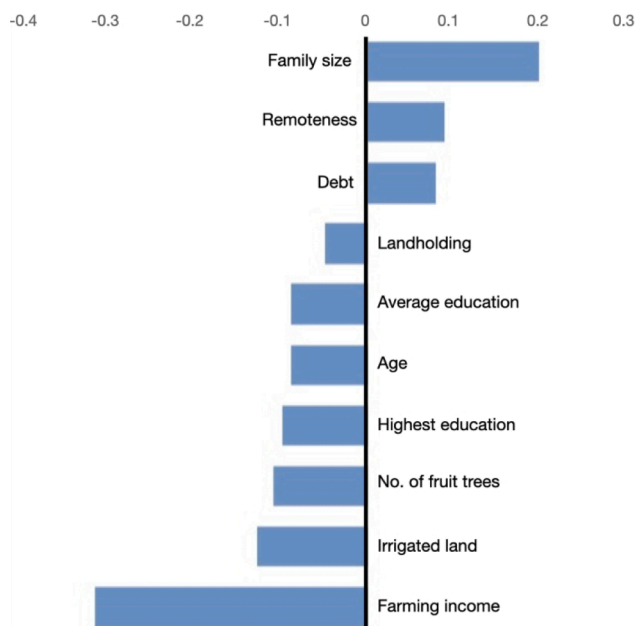


Fig. 6. Factors found to be significant in the regression model (2) Months/year.

further agricultural improvements, diversify their crops, expand their Wadis, or take up additional income-generating activities. Contrary to the control group, they improve their dietary diversity with their kitchen gardens and confirm that they always have enough to eat at home. The barren wastelands have been transformed into lush green hills with fruit and forestry trees and intercrops. Many farmers have constructed huts in

Table 4
Impact of program participation (Treatment, i.e. participants in program villages) and program spillover effects (Intermediate group, i.e. non-participants in program villages) on frequency (times/year) and intensity (months/year) of seasonal migration.

	Dependent variable:	
	Times/year (1)	Months/year (2)
Participants	-3.795*** (0.169)	-3.185*** (0.145)
Non-participants in program villages	-2.017*** (0.192)	-1.454*** (0.165)
Proxy for remoteness	0.039*** (0.002)	0.031*** (0.002)
Own landholding	-0.296*** (0.027)	-0.225*** (0.023)
Householdsize	0.576*** (0.023)	0.501*** (0.019)
Wealth	0.00002*** (0.00000)	0.00002*** (0.00000)
Gender = male	0.233** (0.097)	0.161* (0.083)
Education	-0.053*** (0.011)	-0.042*** (0.010)
Age	0.005* (0.003)	0.006*** (0.002)
Constant	0.919*** (0.264)	0.521** (0.226)
Observations	9,346	9,346
R ²	0.229	0.234
Adjusted R ²	0.228	0.234
Residual Std. Error (df = 9336)	4.607	3.951
F Statistic (df = 9; 9336)	307.495***	317.337***

Note: *p < 0.1; ** p < 0.05; *** p < 0.01

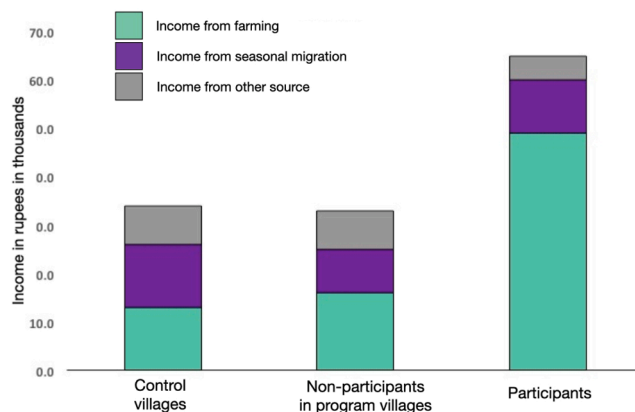


Fig. 7. Comparison of main income sources per household and groups: income from seasonal migration, income from farming and income from other source (bottom to top).

their orchards or moved there completely from the village. Some speak of a reversal of migration for nature conservation. Their ability to stay home has a positive impact on education. All of the participating families surveyed emphasize that their children attend school and that they invest a significant portion of their income in their children's education and other associated costs. Higher education has been found only among the participants. In contrast, the members of the control group mention seasonal migration and costs as reasons for school dropouts. The migration of either one or both parents has the potential of reducing the child's probability of attending school, and an out-of-school child is an important indicator of child labor (Srivastava, 2012). According to Coffey (2013), the most critical social cost borne by seasonal migrants is their inability to send their children to school.

We have learned that almost all surveyed households prefer farming

to seasonal migration for the same income. This widespread aversion to seasonal migration is not surprising in the face of the described harsh and exploitative circumstances and is further reflected in the negative impact of seasonal migration on life satisfaction. It is therefore encouraging to find that in over 60 % of the participating households, at least one person has permanently stopped migrating seasonally since joining the program. Any seasonal migration that still occurs among the participants is not needed for survival but a chance for one member of the family to generate additional income from elsewhere, at certain times of the year when agricultural activities require less manpower. Thus, we find a development from *distress* to *selective migration*. Participating households do not just stop migrating but on average, migrate less than half as much as the control group, while interestingly, their income from seasonal migration is more than half of the earnings of those who migrate for survival. For a seasonal migrant from a participating family, this means earning more money in the same period of time. This is because they can afford to pick only the better offers and are spared the agony of distress migration. They do not have to work at all in the jobs that can be considered the harshest – brick kiln and stone quarry – and less in construction and industrial work in general. However, they are overrepresented in more attractive, skilled, and better-paid jobs, such as tailoring or government service. They also mostly prefer to take jobs in nearby rural areas.

With these findings in mind, we address the important (but as of now, widely left unanswered) question (already posed by Haberfeld et al., 1999) of whether social policies should aim at reducing seasonal migration. We emphasize that the crucial point is to *change the underlying reason* (i.e., chronic poverty) of distress-induced seasonal migration. For many migrant workers, seasonal migration is a defensive coping strategy, which persists even though the families do not improve their income or security but perpetuate their dependency by only servicing high-interest, subsistence-related debts. Here, it makes an essential difference to create alternative income sources at home in order to enable the transition from distress to selective migration. As a result, a few will still leave home for seasonal migration out of choice to further diversify their stable rural existence and to invest in assets, but they no longer depend on the most crucial practices and can pick the better offers. This goes hand in hand with the finding that people under the age of 18 who seasonally migrate and whose families are program participants have completed, on average, 7 years of education compared with 4 years in the control group. Seasonal migration cannot be stopped (Sucharita & Rout, 2019), and it should not be the goal of development efforts to prevent it entirely. It is a by-product of developmental processes, important for the redistribution of resources from richer to poorer localities, and stopping it would mean depriving people of jobs and experiences outside their villages. Thus, opposing migration and rural livelihoods is false, just as the case of simply taking the reduction of seasonal migration as the measurement of the success of rural development (de Haan, 1999). One has to move beyond a narrow economic viewpoint and acknowledge seasonal migration as part of diverse livelihood strategies.

Our findings suggest important spillover effects, namely that entire places of seasonal migration can be transformed. There is a significant positive impact on the village level as non-participants also profit from an enhanced local economy. They now find employment opportunities nearby, such as agricultural labor in Wadis, processing, or marketing of Wadi produce (e.g., cashew and mango). Compared with the control group, their dependence on seasonal migration is substantially less in all parameters: frequency, intensity, duration, distance, income, and debt. Another positive spillover effect is the widespread development of Wadis without external support.

This impact assessment provides better insights into the underlying causal links, generating an understanding that can feed into the design of future programs. The Wadi concept can be scaled up to reduce distress migration elsewhere, too, as this type of migration is common in developing countries (Banerjee & Duflo, 2007; Bryan et al., 2014;

Morten, 2019). The Wadi program has drastically improved the lives of poor smallholders, enabling them to escape a vicious cycle of poverty and seasonal migration. The smallholders have converted wastelands into valuable assets and are now literally rooted to their lands, just like the trees they planted.

CRediT authorship contribution statement

Inga Mareike Nienkerke: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration. **Amit Thorat:** Writing – review & editing. **Anthony Patt:** Writing – review & editing, Conceptualization, Methodology, Visualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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