

Smallholder farmers' climate-resilience index

A quantitative approach to estimate smallholder farmers' resilience in Bihar against climate hazards' impact

24 November 2023



Table of contents



Introduction to smallholder farmers' climate-resilience index



Smallholder farmers' resilience index and factors that affect it



Analysis of the levels of availability of livelihood capitals



Additional findings based on cross-tab analysis



Gender-nuanced findings



Comparison of the access to livelihood capital between SHFs and microfinance borrowers



Annexes



Glossary of terms



Smallholder or smallholder farmers (SHFs):

As per the Food and Agriculture Organization, smallholders are small-scale farmers, pastoralists, forest keepers, and fisherfolk who manage areas that vary from less than one hectare to 10 hectares. Smallholders are characterized by family-focused motives, such as a bias for the farm household system's stability, usage of mainly family labor for production, and usage of a part of the produce for family consumption.



Small and marginal farmers:

As per the Press Bureau of India, small farmers have operational land holding sizes between one and two hectares. Marginal farmers have operational land holding sizes of less than one hectare.



Microfinance institutions (MFIs):

MFIs in India are of various kinds. However, non-banking finance companies comprise most MFIs in India. As of December 2022, NBFC Microfinance institutions had a market share of 35.7% in gross loan portfolio.



Climate-resilience:

The Intergovernmental Panel on Climate Change (IPCC) defines climate resilience as “the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, respond or reorganize in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation.”



IVR survey:

An interactive voice response (IVR) survey is a survey technique that uses an automated telephony system. The system allows callers to interact with a computer-operated telephone system through voice and a keypad.

Acknowledgements

We acknowledge the support of Gram Vaani, which recruited smallholders and conducted IVR-based surveys.

We acknowledge the support and enthusiasm of Mr. Calum Scott, Strategy Lead-Climate Change and Microfinance, Opportunity International Australia. He implemented our survey tool with Opportunity International's microfinance partner, Pahal Financial Services Private Limited.

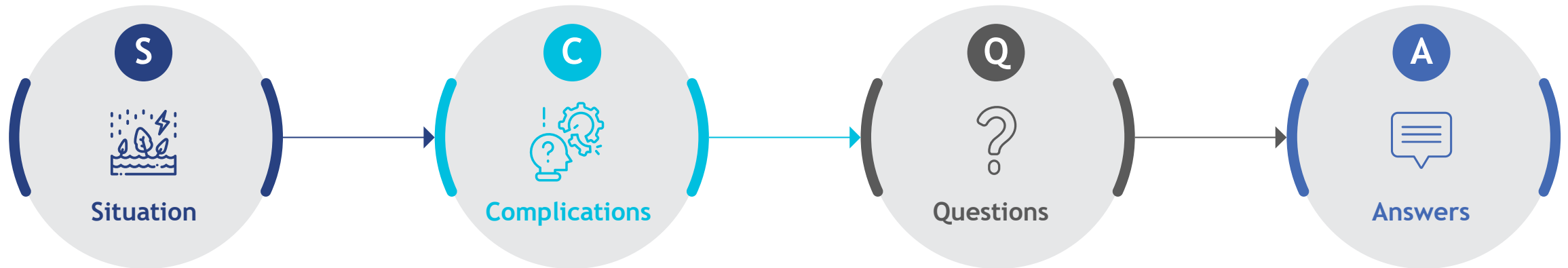
We also thank Mr. Kartik Mehta, Managing Director, Pahal Financial Services Private Limited, as he shared their survey results with us. The survey results allowed us to compare the access and use of various livelihood assets between Bihar's microfinance customers and smallholder farmers.



Introduction to smallholder farmers' climate-resilience index



Background of the smallholder farmer (SHF) climate-resilience index



Climate change has been affecting smallholder farmers' (SHF) lives and livelihoods worldwide. Numerous region-specific studies by reputed institutions reveal the challenges caused by climate change.

The studies highlight that climate change has caused regionally different but mostly negative impacts on crop yields and products' quality and marketability. This has further worsened SHFs' financial health. Some studies recommend ways to strengthen climate resilience.

However, only a few reliable indices can measure SHFs' climate resilience at present. Some indices are complex, such as the IPCC Livelihood Vulnerability Index, while most are not published.

The absence of an easy-to-adopt index makes it difficult for the private sector to design solutions to strengthen SHFs' climate resilience. It also hinders private investment's flow in climate adaptation.

Therefore, several questions arise:

What metrics can help formulate an easy-to-adopt index that delineates SHF's level of climate resilience?

Given the diversity among SHF groups, can these metrics apply to a wide set of SHF groups?

Will digital technology-enabled survey methods enable regular data collection and strengthen the index?

MSC attempted to answer these questions through:

- Identification of 19 metrics that inform SHFs' resilience strategies against climate hazards;
- Deployment of IVR-based surveys to collect responses from 571 smallholders in Bihar, India;
- Analysis of the response to create an easy-to-adopt index of SHFs' climate resilience.

Objectives of the smallholder farmer (SHF) climate-resilience index

01

To make it simple for diverse stakeholders to understand how resilient SHFs are against climate hazards;



02

To lay the foundation for a globally valid and reliable framework that can determine SHFs' level of resilience against climate hazards;



03

To supplement expensive in-depth studies to measure SHFs' resilience through the application of a lean data collection framework and advocacy of low-cost data collection techniques;



04

To enable grassroots organizations, such as MFIs, farmer collectives, and community-based organizations, to measure their members' resilience and inform locally-led adaptation or resilience strategies;



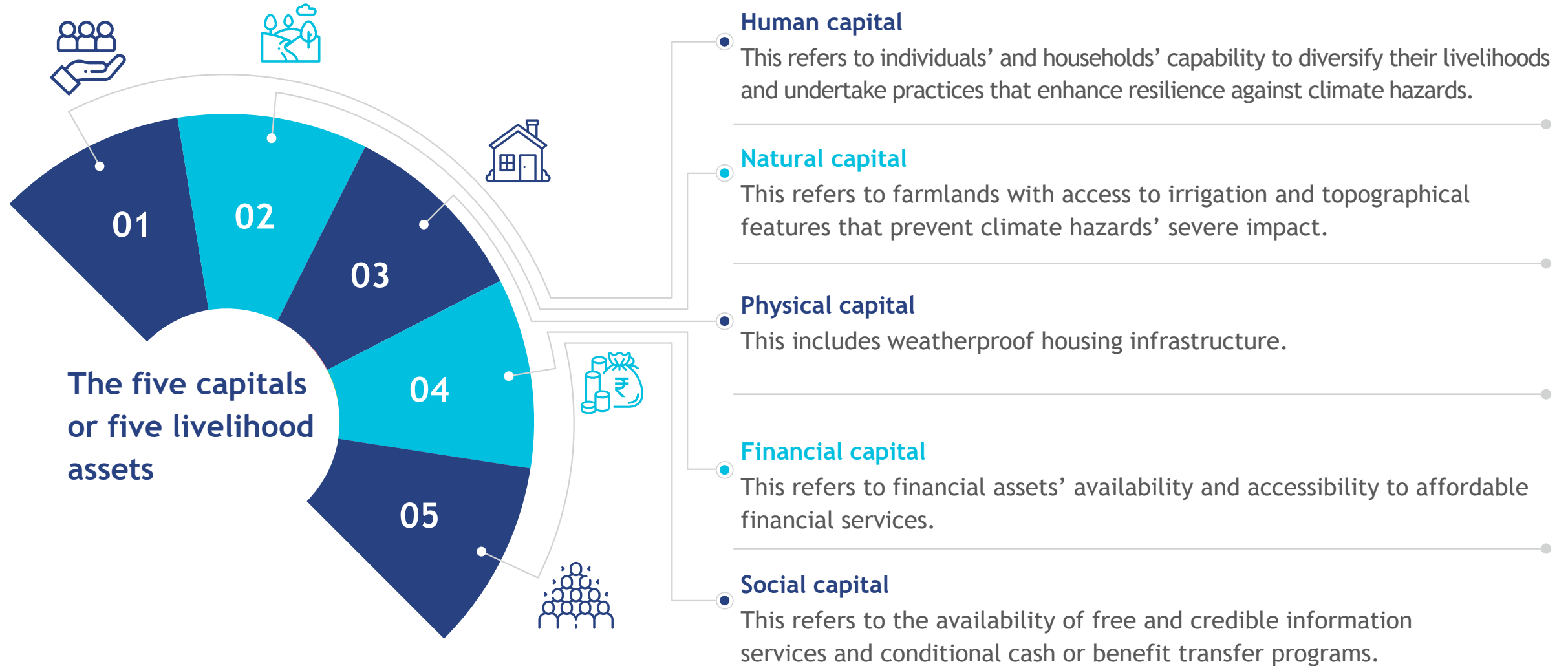
05

To encourage development agencies to periodically measure their interventions' impact on SHFs' resilience levels over a period.






The framework we adopted to measure SHF's climate resilience

Our in-depth qualitative research revealed that the following five capitals drive sustainable livelihoods and enhance households' ability to cope with shocks induced by climate hazards.



Key elements that comprise each of the five capitals

Our extensive qualitative research showed that the availability or accessibility to these key elements, which comprise each of the five capitals, informs the coping mechanisms of Bihar's SHFs against shocks induced by climate hazards.

Capitals	Human capital 	Natural capital 	Physical capital 	Financial capital 	Social capital 
Key elements that inform coping strategies against shocks	Access to non-farm income sources	Availability of irrigation facilities	All-weatherproof housing infrastructure	Adequate savings to meet emergencies	Access to free and credible weather information
	Diversified cropping practice	Existence of natural protective cover around the parcel of land farmed	Investments to buttress the house's structure against natural hazards	Adoption of crop insurance	Access to free and credible market information
	Ownership of livestock			Adoption of livestock insurance	Access to free and credible advisory on crop and livestock
	Investments in agricultural land development			Access to affordable and unsecured credit	Access to funds under the government's cash transfer programs
	Adoption of tolerant and resilient seeds			Ability to avoid the need to sell assets in times of distress	Eligibility for G2P (government-to-person) programs

The analytical approach we adopted

We believe that as the availability of these elements and access to them increases, which comprise the five capitals, individuals' and households' capability to cope with shocks induced by climate hazards strengthens.

We identified¹ a set of key elements that comprise each of the five capitals. Their availability and accessibility will strengthen² resilience. For example, an element in “human capital” is a smallholder household’s ability to access non-farm income sources. This will enable the household to cope with the financial impact of crop failures.

We recorded the availability or accessibility, or both, of these key elements. We recorded the possible responses to any inquiry into availability or accessibility, or both, as “Yes” or “No.” We assigned a score of one to “Yes” and zero to “No.” The only exceptions were the three options in response to an inquiry on the type of dwelling (*pucca*, *semi-pucca*, or *kaccha*). We assigned a score of one to “*pucca*,” 0.5 to “*semi-pucca*,” and zero to “*kaccha*.”

We assigned weights to the recorded responses. We distributed the weights across the elements equally. For example, five elements exist under “human capital.” Therefore, each of them bears a weight of 20%.



Based on these assigned weights, we computed the weighted percentage score obtained by a respondent against the maximum score of 100%. We computed these weighted scores for 571 respondents.

We computed the sample median (sample size = 571) score against each capital. We assigned the median score against each capital as the threshold score, which determined the optimal availability or accessibility to that capital.

The overall score is a weighted percentage score, which includes the scores obtained against each capital.

¹ We conducted in-depth qualitative research to identify key elements and establish their relationship with SHFs' climate resilience. The next slide elaborates on the key elements.

² We could not establish each element's exclusive contribution to strengthen climate resilience. However, we understand that collectively, they strengthen resilience through interactions with each other and inform the choices against these elements.

Analysis methodology explained

We assigned weights to the recorded responses to analyze the obtained responses. We distributed the weights across the elements equally. For example, five elements exist under “human capital.” Therefore, each of them bears a weight of 20% or 0.2.

We used these weights to multiply the score obtained by a respondent based on their response against a parameter.

Type of livelihood capital	Number of key elements	Weights assigned to each key element
Human	Five	20%
Natural	Two	50%
Physical	Two	50%
Financial	Five	20%
Social	Five	50%

The following example explains our scoring methodology based on the responses provided by respondent #209003735. The respondent scored 0.4 or 40% in “human capital.” Similarly, respondent #209003735 obtained scores of 50%, 0%, 20%, and 20% in “natural capital,” “physical capital,” “financial capital,” and “social capital,” respectively. Respondent #209003735’s **overall resilience score** is the average of the scores under all five capitals, which is 26%.

Key elements that inform coping strategies against climate shocks	Response	Score	Weights	Weighted score
Access to non-farm income sources	Yes	1	0.2	0.2
Diversified cropping practice	No	0	0.2	0.0
Ownership of livestock	Yes	1	0.2	0.2
Investments in agricultural land development	No	0	0.2	0.0
Adoption of tolerant and resilient seeds	No	0	0.2	0.0
Total score under “human capital”				0.4

Categories and the categorization methodology

Based on each respondent's overall resilience scores, we have categorized them into three categories, as described in the table on the right.

Score range	Categories
Up to 33%	Vulnerable
Between 33% and 66%	Coping
Greater than 66%	Resilient

Explanation of the three categories



Vulnerable:

In the context of climate change, vulnerability refers to the propensity or predisposition to be adversely affected by climate change. Vulnerability is the exposure to the unmitigated section of a specific climate hazard. It encompasses various factors, which include sensitivity or susceptibility to harm and lack of capacity to cope and adapt. If we apply the five livelihoods capital approach, vulnerability is defined as the absence or extreme insufficiency of livelihood assets that weaken SHFs' ability to cope with climate hazards.



Coping:

Coping, in the context of climate hazards, refers to the strategies and actions individuals, communities, and governments take to manage, adapt, and recover from the impacts of climate change and extreme weather events. In the context of our study, a higher level of livelihood assets' availability will reduce vulnerabilities and allow SHFs to cope with climate hazards.



Resilient:

The IPCC defines climate resilience in the context of development as a “**reduction in the exposure and vulnerability**” to climate hazards. In the context of our study, the smallholders categorized as “resilient” have the highest levels of availability of livelihood assets that allow them to **reduce exposure** to climate hazards. For example, proper leveling of fields prevents waterlogging during pluvial floods and efficiently uses irrigation water. Early warnings of potential pluvial flooding allow people to relocate their belongings. The availability of livelihood assets also **reduces vulnerability** when exposed to climate hazards. For example, a concrete (*pucca*) house is resilient against pluvial floods, and flood-tolerant rice varieties can survive waterlogged conditions for months.

Smallholder farmers' resilience index and factors that affect it



Less than 15% of Bihar’s smallholders are resilient against climate change’s impacts



Our earlier study on climate change’s impacts on smallholders in Bihar and studies conducted by CEEW and Social Indicators Research reveal that Bihar’s smallholders are extremely vulnerable to floods and erratic monsoon seasons. Our analysis of the accessibility to select livelihood assets and access to them suggests that Bihar’s SHFs have several sources of vulnerability. These include the lack of climate-resilient agricultural practices, irrigation facilities, flood-resistant dwelling structures of humans and livestock, awareness of risk-mitigating financial products, and government benefits.

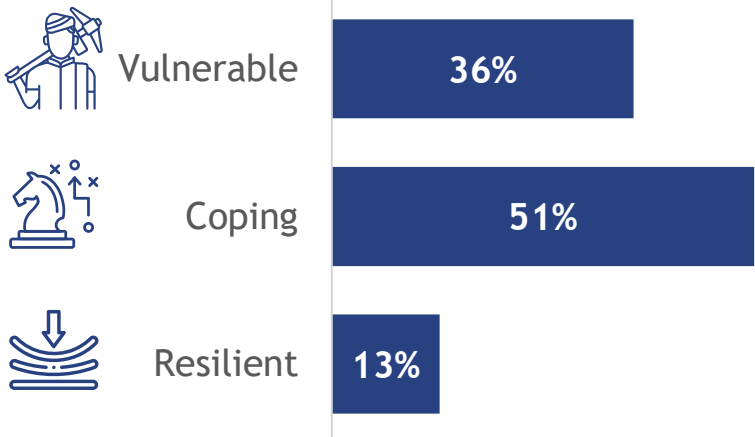
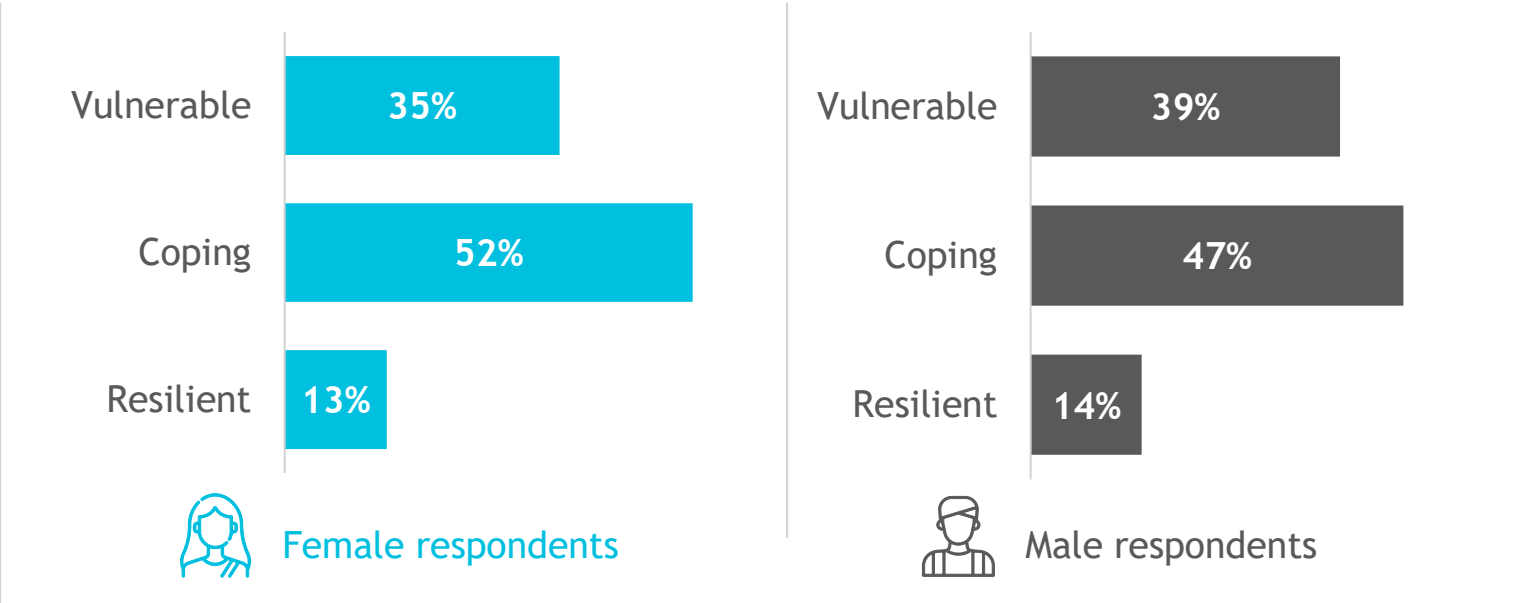


Figure 1.0: Our survey revealed that only 13% of SHFs in Bihar are resilient against climate change’s impacts, while 51% have been coping with these impacts.



Figures 1.1 and 1.2: No significant differences exist between the percentages of female and male respondents under each category.

Inadequacy of financial and social capital is detrimental to Bihar's SHFs' resilience levels

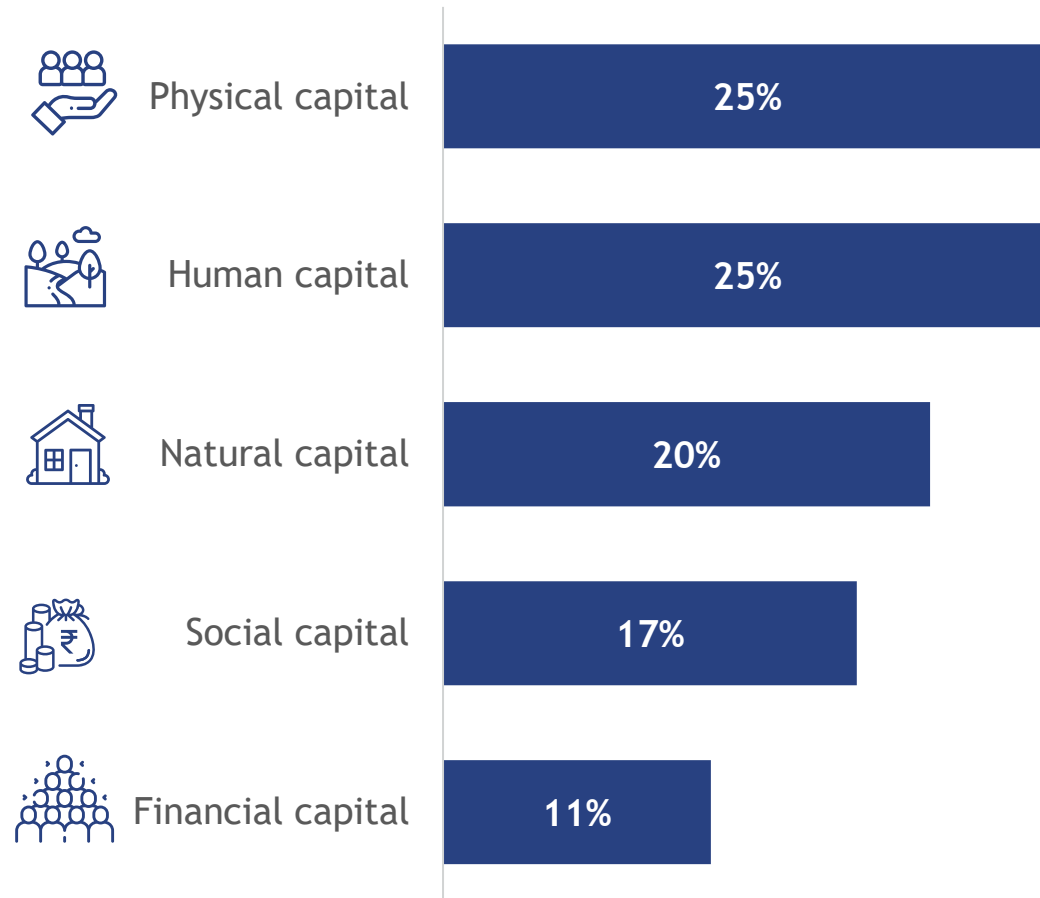


Figure 2: Bihar's SHFs' lack of accessibility to financial products* and their inability to avail of various government programs*** benefits deprives them of critical resources to stand resilient against climate change's impacts.

The lack of accessibility to financial products,* such as crop and livestock insurance, and SHFs' inability to access various government programs'*** benefits, such as the [Bihar State Crop Assistance Scheme](#), increases their unmitigated exposure to climate hazards, such as floods and droughts. Similarly, the lack of timely and adequate weather information and crop and livestock advisory increases vulnerability, as it exposes farmers to climate hazards they are unprepared for.

Smallholders incur financial losses due to their inability to protect their key livelihood assets: crops and livestock. Financial losses impair their ability to invest in concrete houses and flood-resilient shelters for livestock, buy costly flood-resilient seeds, and repay their debt obligations to formal and informal creditors on time. Income diversification efforts remain insufficient to pull smallholders out of this vicious cycle of hazard-exposure-vulnerability.

Therefore, based on the findings of this study and our understanding of the state of Bihar's SHFs' vulnerability, we infer that inadequate levels of financial capital and social capital affect the accessibility to other livelihood capitals.

Analysis of the availability levels of livelihood capitals



Bihar's SHFs rely on income diversification to inform their coping strategy against shocks induced by climate hazards

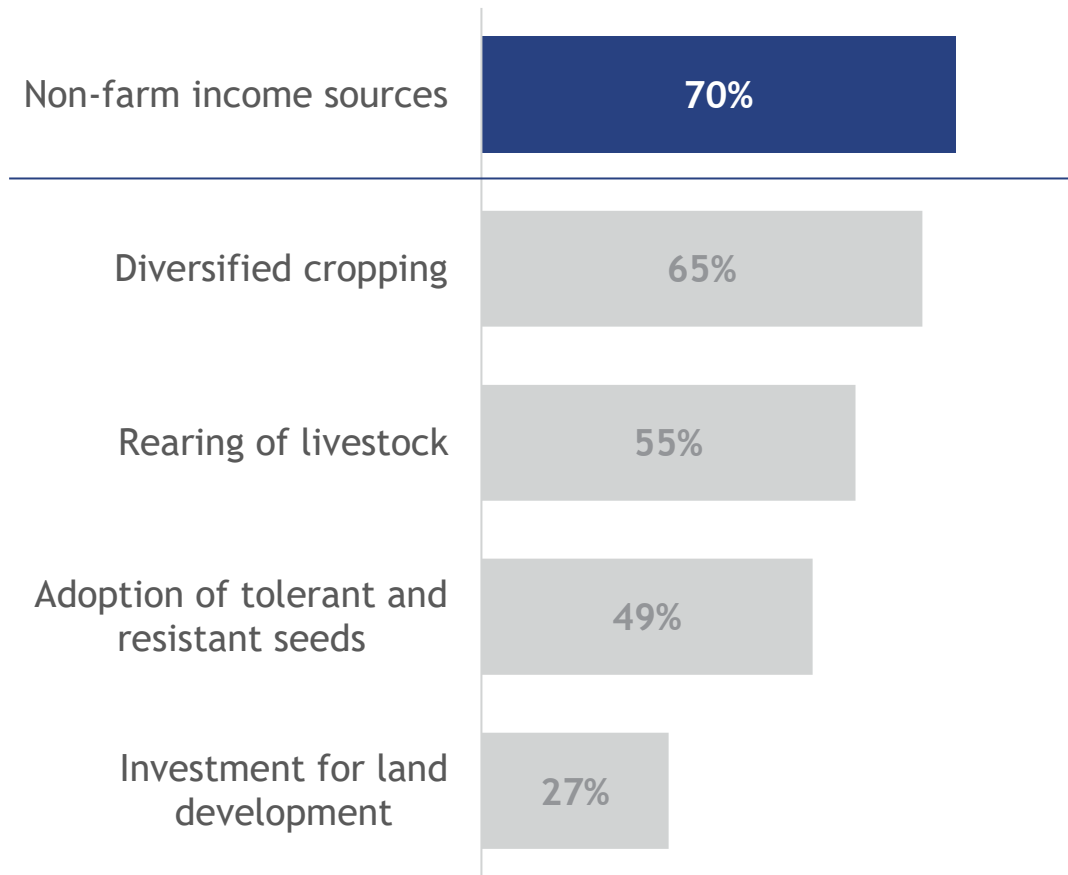


Figure 3: Income diversification through participation in non-farm occupations was the most frequently accessed key element within “human capital,” followed by crop diversification and livestock rearing.

- Our study revealed that 70% of the 571 SHFs surveyed depended on non-farm income sources to diversify their income risk. However, we can also infer that these SHFs do not have a choice but to rely on non-farm sources to maintain their livelihoods;
- 71% of our respondents own less than 0.25 hectares of agricultural land. Per our estimates, the annual revenue these farmers can generate from *kharif* and *rabi* crops, such as rice and wheat, would be less than INR 30,000 (~USD 365). Therefore, they would not sustain themselves without participation in rural or urban wage markets or both.
- Sambodhi conducted a similar study in 2022 across 20 states, which included Bihar. It reported that 68.29% of their respondents, who comprised marginal farmers, were engaged in non-farm activities. 78.09% of these respondents who reported non-farm income were engaged in daily wage labor. Therefore, we can conclude that our findings represent Bihar's SHFs.
- Other major coping mechanisms include crop diversification and rearing livestock.

SHFs in Bihar have adequate access to irrigation facilities, but natural measures against pluvial flooding are inadequate

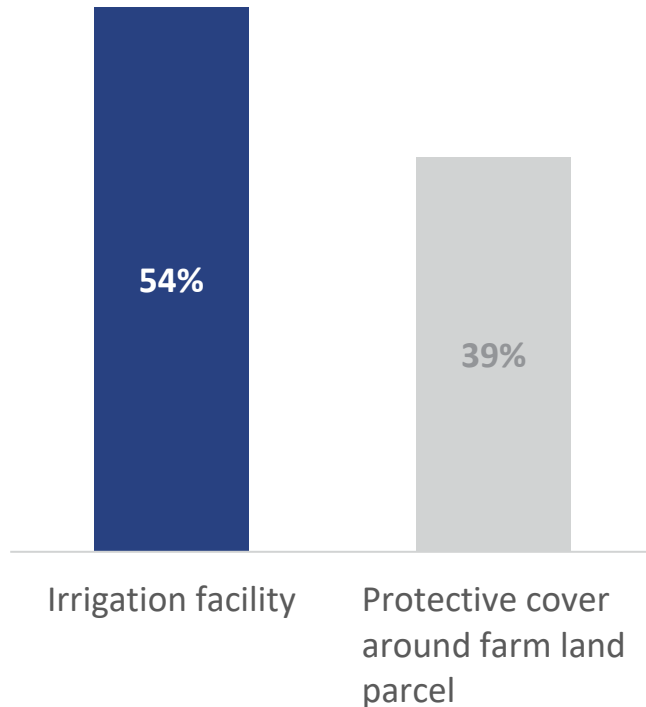


Figure 4: 54% of our respondents reported that they have access to irrigation water. However, only 39% reported that their farmland has some kind of natural vegetation cover to protect against strong winds and topsoil runoff during pluvial floods.

- ✦ About 76% of Bihar's 7.26 million hectares of arable land is irrigated. However, in terms of availability during the cropping season, our survey found that 54% of SHFs can access an adequate amount of irrigation water;
- ✦ The high availability of irrigation water and Bihar's generally low-lying topography make it suitable for water-intensive crops, such as rice. However, as noted before, rice cultivation is not economically sustainable for SHFs. Therefore, about 65% of our respondents reported that they adopted a diverse set of crops to increase their farm income. Our earlier study on climate change's impact on smallholders and their coping strategies revealed that SHFs have been increasingly sowing vegetables through high-yield hybrid seeds.
- ✦ Bihar's agroclimatic conditions are conducive to an intensive and diversified cropping system. However, flooding is a major natural hazard that risks SHFs' livelihoods. As such, 73.63% of North Bihar's geographical area is flood-prone. Our study revealed that only 39% of SHFs reported that natural covers protect their farm parcels to prevent topsoil runoffs.
- ✦ Therefore, we infer that many SHFs have received access to irrigation facilities. However, smallholders cannot protect their crops from inundation by pluvial floods due to a lack of investments in land leveling and protective vegetation around the fields.

Bihar's SHFs' dwelling structures need floodproofing

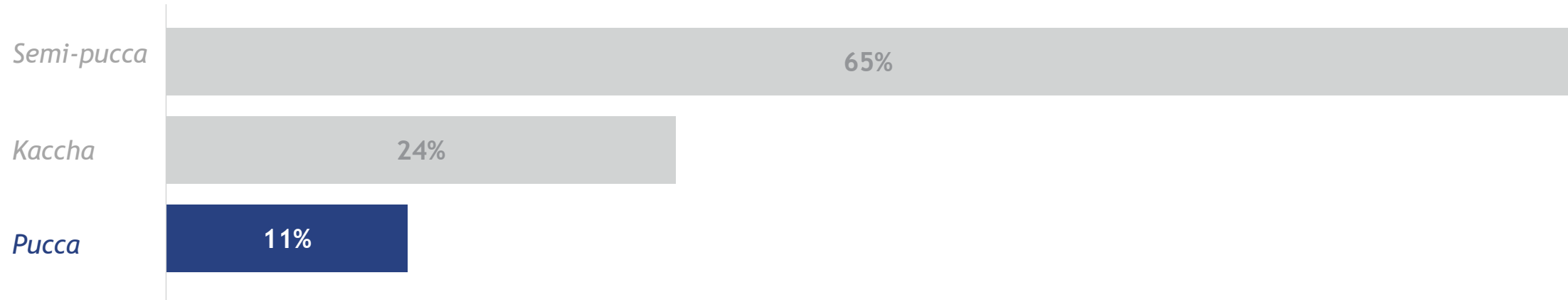


Figure 5: Only 11% of the smallholders surveyed resided in pucca houses that can withstand flooding

- 89% of the 571 smallholders surveyed resided in houses made of composite materials (*semi-pucca* houses) and mud (*kaccha* houses). Moreover, only 30% of them had undertaken measures to prevent damage to their houses and cattle sheds by flood waters;
- Therefore, Bihar's smallholders significantly lack the physical capital needed to protect their belongings and assets from flood waters;
- As such, between 2000 and 2012, out of the 2.95 million houses damaged by floods, only 6% were *pucca* houses. This fact validates our findings that a lesser percentage of *pucca* houses exist. Alternatively, we can also infer that the number of *pucca* houses damaged by flood is fewer.



Exhibit 1*: The house in the foreground is an example of a typical *pucca* house. The structure in the background is made of bricks and mud, which are composite materials. Its roof is laid with bamboo and mud tiles. These are typically called semi-pucca houses.

* This photo was captured by MSC's research team during the in-depth research

Limited access to inclusive financial services weakens Bihar's SHFs' resilience against climate shocks

Type of hazards	Impact on crops and livestock	Coping mechanism	Suitable financial services	Current availability ¹
Marked shifts are observed in the monsoon rainfall pattern. Bihar has been experiencing deficit rainfall during the rice sowing season but excess rainfall during the rice harvesting season.	This shift in the monsoon rainfall pattern directly affects rice, that is, <i>kharif</i> , and wheat, that is, <i>rabi</i> , crop productivity. It limits the duration of cropping. Certain pathogens find the condition favorable to attack crops, which further causes loss of productivity.	Farmers must invest in irrigation equipment, apply more fertilizers, and use more pesticides. These additional expenses decrease the marginal returns from agriculture. Moreover, the indiscriminate use of these practices <u>degrade soil nutrients</u> , harm the <u>local biome</u> , and <u>deplete water tables</u> .	An adequate amount of savings would help meet the cashflow deficit from farm sources.	Only 41% of the respondents save money to meet cashflow shortfalls.
Annual pluvial floods are common across Bihar. Early summer heat waves have become frequent and intense.	Floods damage standing crops. Early summer heat adversely affects the grain formation of wheat crops.	At present, smallholder farmers (SHFs) lack coping mechanisms. They need to borrow money to meet expenses and hope to make up the losses for the next season.	Inclusive credit for climate-adaptive farming practices can be a useful coping mechanism.	Only 52% of the respondents had access to affordable unsecured loans.
Most districts of Bihar are susceptible to large-scale fluvial floods.	During these events, both crops and livestock are affected, which leads to significant economic damage.	SHFs lack any coping mechanism against these massive annual fluvial floods.	Crop and livestock insurance can prevent the deterioration of SHFs' financial health.	Only 19% of the respondents availed of crop insurance, and 16% availed of livestock insurance.

Current availability¹ = The respondent currently has access to the financial service in question.

Lack of information is the major reason for insurance’s muted uptake among Bihar’s SHFs

This implies that in **92%** of cases, the lack of adequate marketing of available livestock insurance products and their benefits is the reason for their shallow uptake.

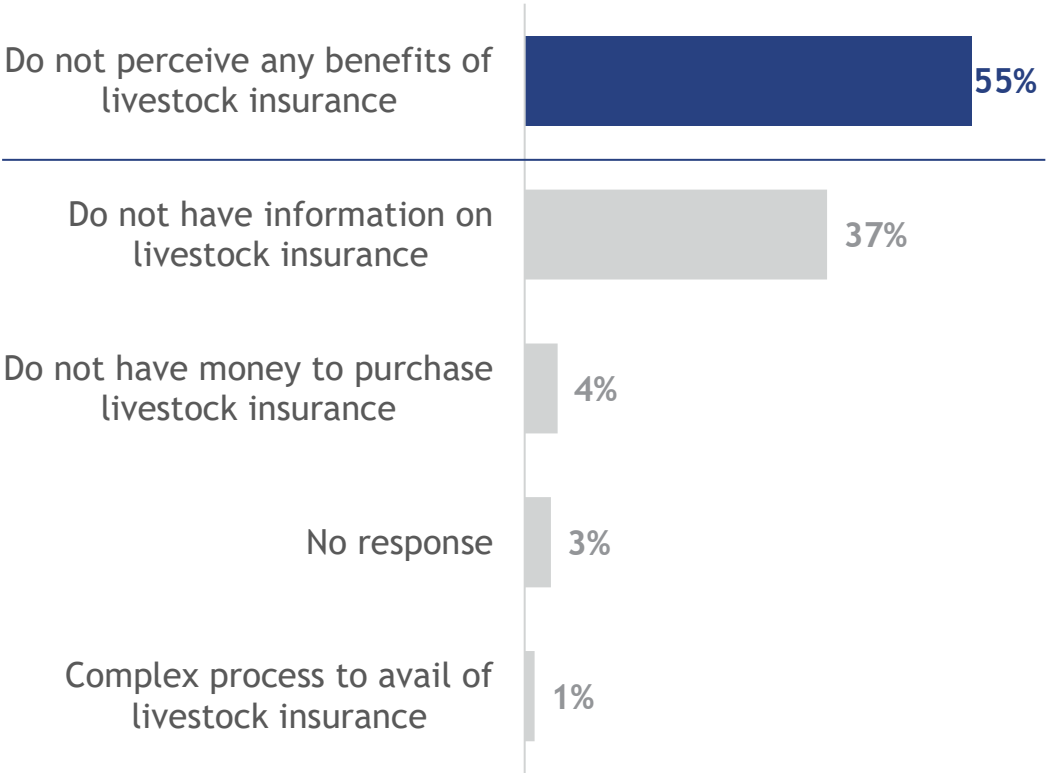


Figure 7: 55% of Bihar’s SHFs do not perceive any benefits of livestock insurance. Another 37% have no information on livestock insurance.

Similarly, the lack of adequate information deprives Bihar’s SHFs of crop insurance. However, the information gap about crop insurance is a bit nuanced in Bihar. The state has a crop protection assurance program named the Bihar State Crop Assistance Scheme. The program is completely subsidized by the state government, unlike the central government’s Crop Insurance Scheme.

However, about 42% of respondents said they do not have money to buy insurance. This implies that SHFs poorly understand the state’s insurance program. Therefore, in total, **96%** of SHFs lack adequate information about the available crop insurance program.

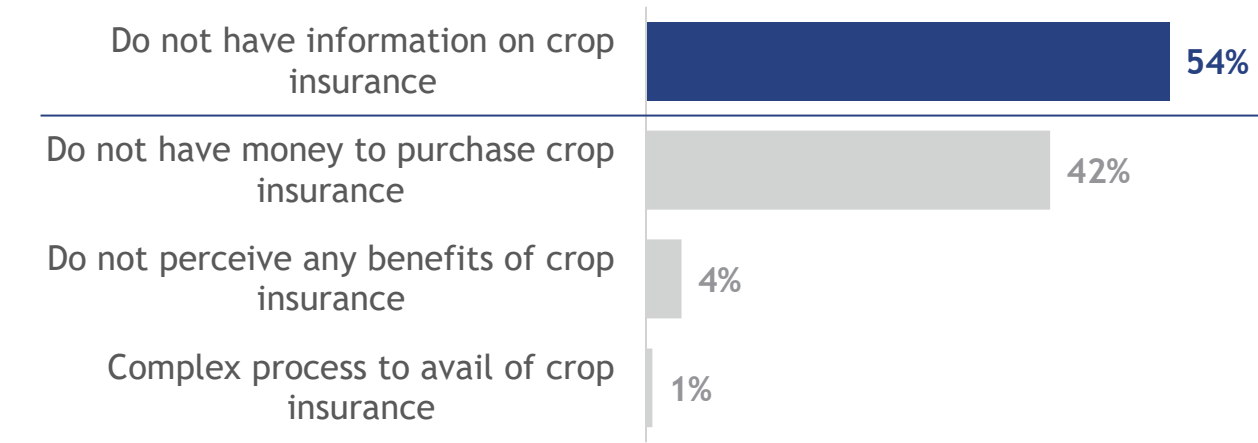


Figure 8: 96% of SHFs lack adequate information about the available crop insurance program.

Bihar's SHFs commonly resort to selling assets to meet emergency needs

33%

of the surveyed respondents reported they sold household assets, such as land, livestock, or jewelry, among others, to meet emergency cash needs.

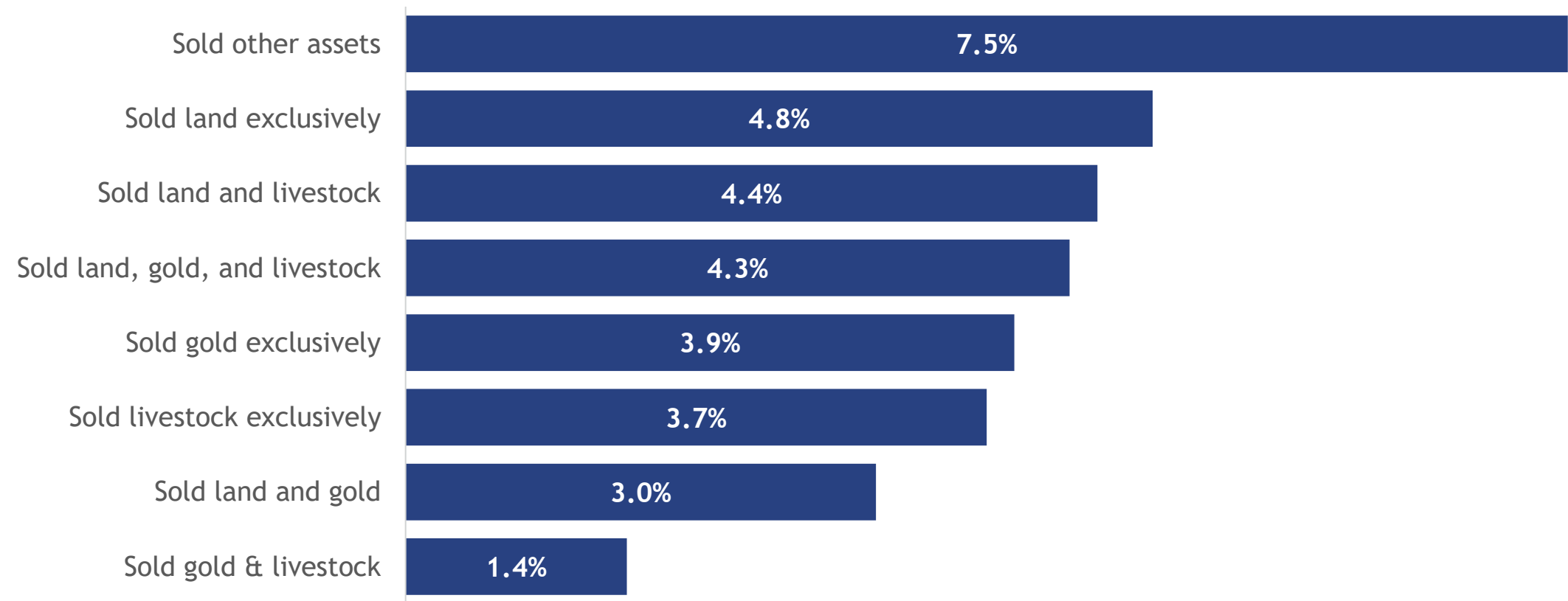


Figure 9: About 13% of the surveyed respondents sold off either land, livestock, or jewelry to meet emergency cash needs. Additionally, about 7.5% of the surveyed respondents sold other household assets.

Microfinance services provided through SHGs are the key source of unsecured loans for Bihar's SHFs

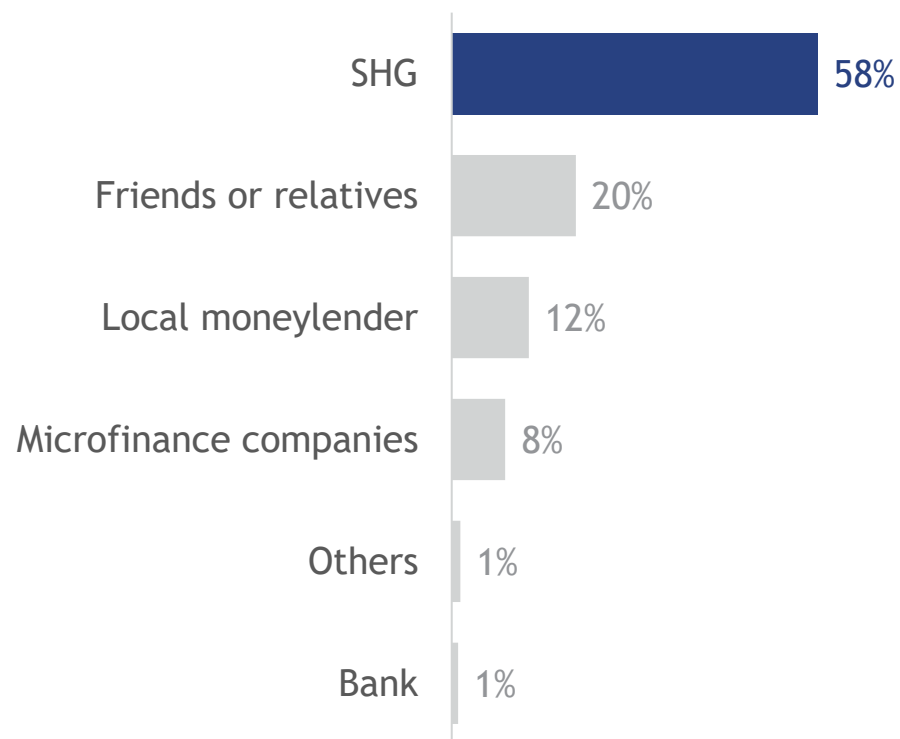


Figure 10: About 58% of Bihar's SHFs depend on their SHGs for unsecured loans. However, 38% of the respondents still depend on informal sources, such as relatives, friends, and moneylenders, for fast and unsecured loans.

- Self-help groups¹ (SHGs) promoted by Bihar's State Rural Livelihood Mission (JEEViKA) have contributed significantly to financial inclusion.
- 89% of SHGs under the JEEViKA program have access to credit. Bihar has the second-highest percentage of SHGs linked with credit after Andhra Pradesh at 90%.
- JEEViKA ensured timely repayment and regular submissions of SHGs' credit utilization reports to the banks. This enhanced the bank's trust level, which led to the sustained delivery of inclusive financial services to SHG members.
- The Small Industries Development Bank of India (SIDBI) helped JEEViKA develop a digital financial services strategy and an implementation roadmap. It sought to strengthen the bank's BC agent network and alternate channels, such as mobile banking, to improve the quality of last-mile banking services and cashless transactions.

¹ A JEEViKA SHG comprises 10 to 15 women who reside within the same residential neighborhood of a village. The core function of each group is to collect savings from individual members and use the savings to support intra-group lending. Government grants and bank borrowing subsequently enhance these internal funds. The interest rate on SHG loans of 2% a month is significantly lower than what informal lenders charge. Group members decide the loan amounts and who gets a loan. The program operates at scale. It targets coverage of all poor women within the definition of target households, which varies across states. Bihar, in particular, uses a broad definition that covered 12 million households by 2021.

Only a few SHFs have access to information that enables them to make informed choices about their livelihood practices

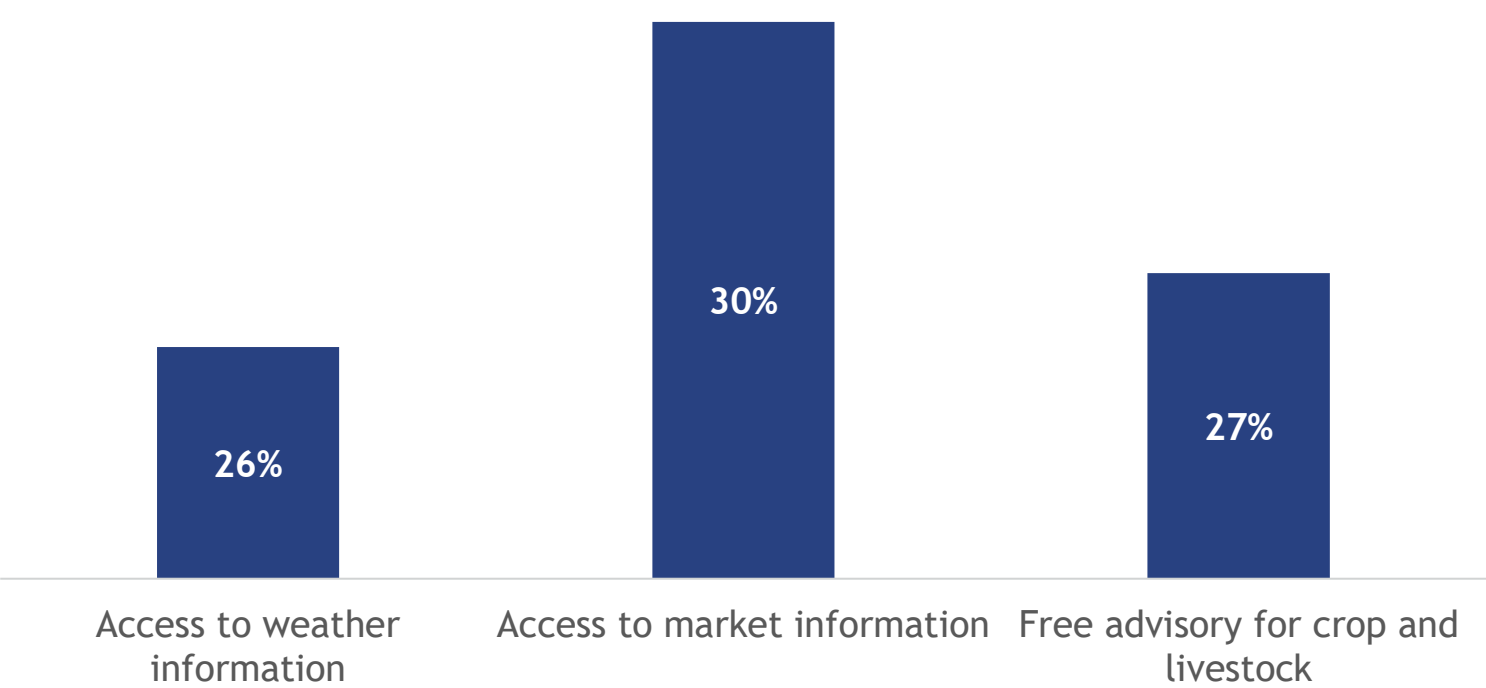


Figure 11: Percentage of respondents who have access to each type of information about their livelihood practices.



Only **11%** of the respondents received all three types of information on weather updates, crop and livestock management advice, and market data.



Only **14%** of the respondents received crop and livestock advisories and weather updates.

56% of the respondents did not have access to any information about their livelihood practices.

More than half of the SHFs eligible for government-to-person (G2P) programs do not receive any G2P benefits

70% of the surveyed respondents claim to be eligible for one or more G2P benefit transfer programs.



However, **62%** of the respondents who claimed to be eligible for G2P benefits responded that they did not receive such benefits.



Reasons for this gap between knowledge about subsidies and inability to avail of them

MSC undertook a series of studies to understand SHFs' challenges to access the central government's G2P programs, such as the irrigation subsidy program—*Pradhan Mantri Krishi Sichayee Yojana (PMKSY)* and the Mission for Integrated Development of Horticulture (*MIDH*). The study led us to understand that:

- A lack of digital literacy and the inability to influence local village-level administrative officials and the *panchayat* are why Bihar's SHFs cannot access the G2P program's benefits they are eligible for.
- Block officers, who are the local administrative officers for these G2P programs, are the primary source of information about the program's "eligibility." This term is used to refer to the set of criteria that a beneficiary must meet to be considered for a particular program, benefit, or service. The applicant should carefully review and understand the eligibility criteria before applying, as failure to meet the requirements can result in disqualification. These officers are also the primary facilitators. They exercise discretion when they approve applications under their jurisdiction.
- Often, SHFs cannot submit a valid land possession certificate (LPC). Therefore, administrative officials reject their application. Most farmers in Bihar who own land do not have a clear land title. Therefore, they cannot issue formal tenancy agreements to sharecroppers or tenant farmers.
- Sometimes, farmers do not get subsidies because third parties delay their application process. Under PMKSY, a commercial irrigation company collects applications from farmers who installed equipment specified by the program guidelines. However, the companies' negligence or delay results in the denial of subsidy for the deserving farmer.

**Additional findings based
on cross-tabulation
analysis**



Agriculture advisory services play a major role to influence SHFs to adopt resilience mechanisms and instruments



Our earlier study revealed that agriculture research centers or *Krishi Vigyan Kendras* (KVKs) and output buyers offer useful advice that helps farmers choose the right set of inputs and agronomic practices.

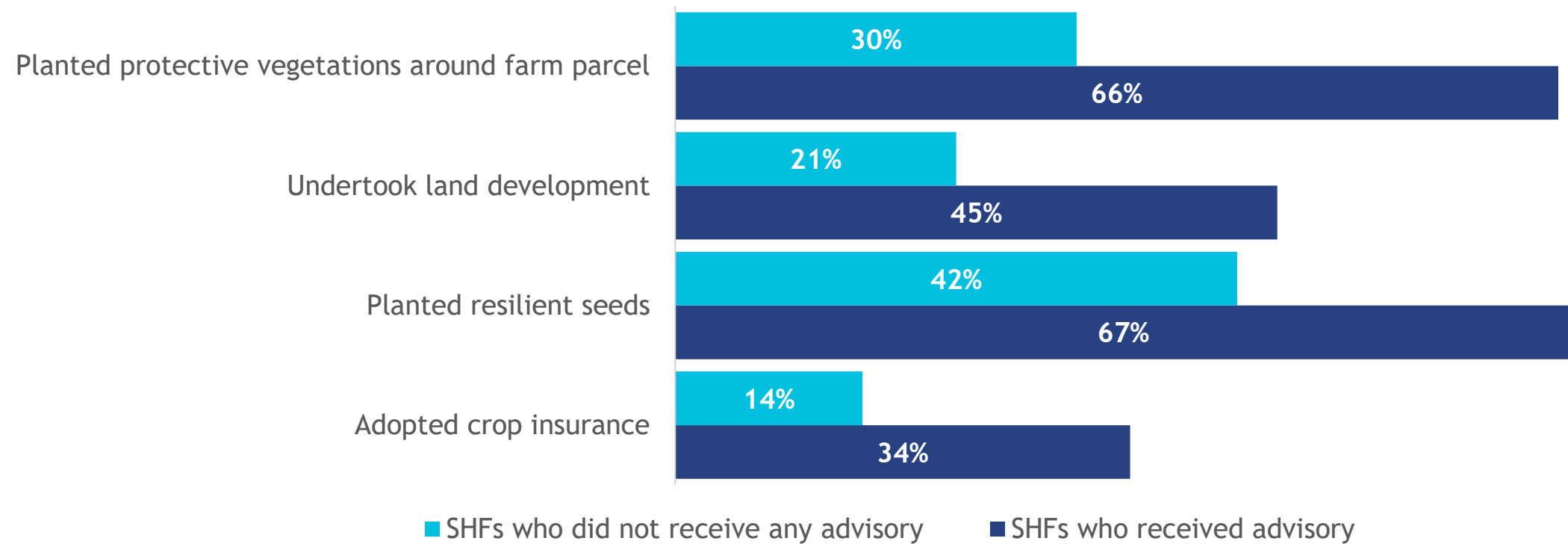


Figure 12: We observed that SHFs who received agriculture advisory were more likely to adopt climate-resilient agricultural practices. For example, 66% of the SHFs who received agriculture advisory planted protective vegetation around their farm parcels. In comparison, 30% of the SHFs who did not receive agriculture advisory services did the same.

Emergency savings might not offer adequate financial protection against climate shocks



We also observed that a higher percentage of SHFs with emergency savings said they had access to credit than those without. The fact that SHGs are the main source of informal credit for these SHFs explains this observation. Most SHGs collect mandatory savings before they allow members to borrow. Therefore, what the SHFs referred to as emergency savings might be the savings with SHGs.

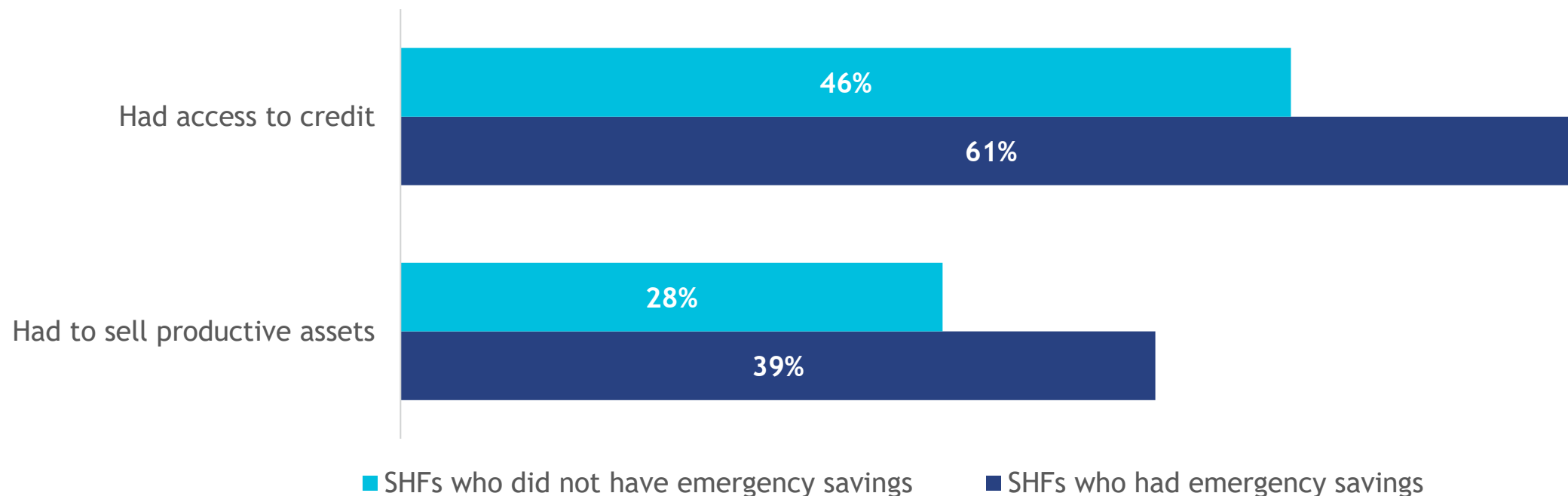


Figure 13: 39% of SHFs who had savings sold their productive assets during emergency cash needs compared to only 28% who had no emergency savings. Therefore, we infer that other factors determine the behavior of “resorting to the sale of productive assets.” One such factor could be that savings were inadequate to meet emergency needs.



Gender-nuanced findings

The difference between female and male SHFs who adopted climate-resilient practices is negligible

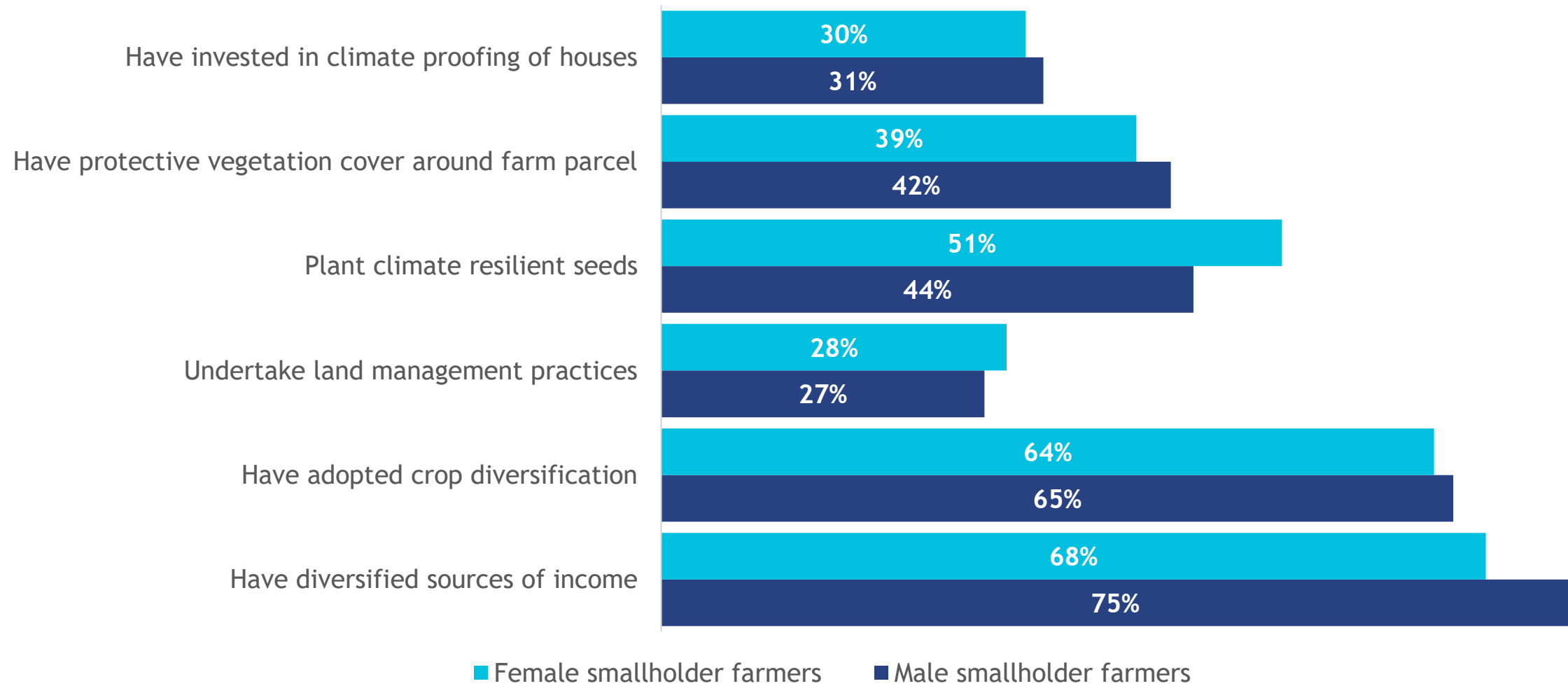


Figure 14: Almost equal percentages of female and male SHFs adopted climate-resilient livelihood practices. The percentage difference between female and male representation under each category of livelihood assets is statistically insignificant.

The percentages of male and female SHFs who received advisory and G2P benefits are almost the same

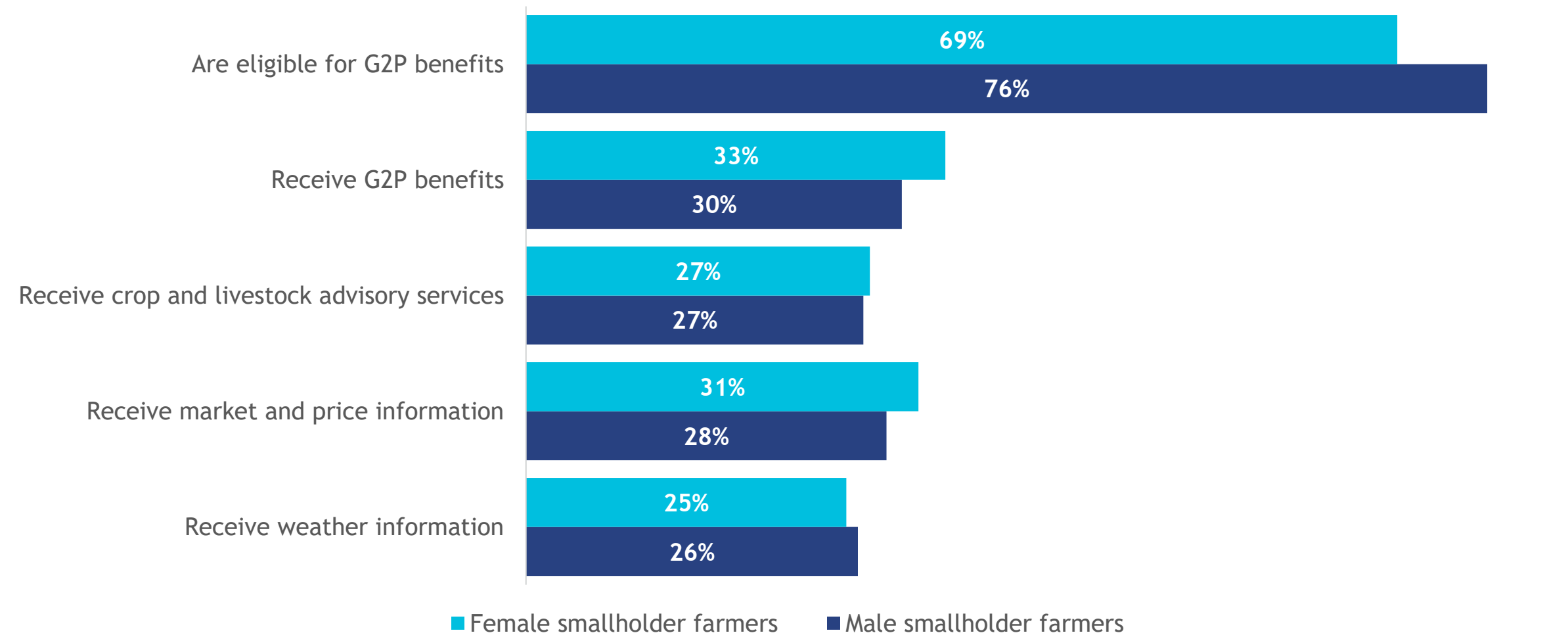


Figure 15: Almost equal percentages of female and male SHFs received agriculture advisory, weather information, and market price information. The percentage difference between female and male representation under each category is statistically insignificant.

A higher percentage of female SHFs have access to unsecured loans



Our data suggests that a higher percentage of male SHFs have access to microfinance loans, while MFIs mostly cater to female customers. This apparent anomaly is because male members sometimes use loans drawn by female household members to undertake small businesses. Therefore, the male farmers mentioned they receive loans from MFIs. The higher percentage of men with access to MFI loans does not indicate that the male farmers directly receive the loans.

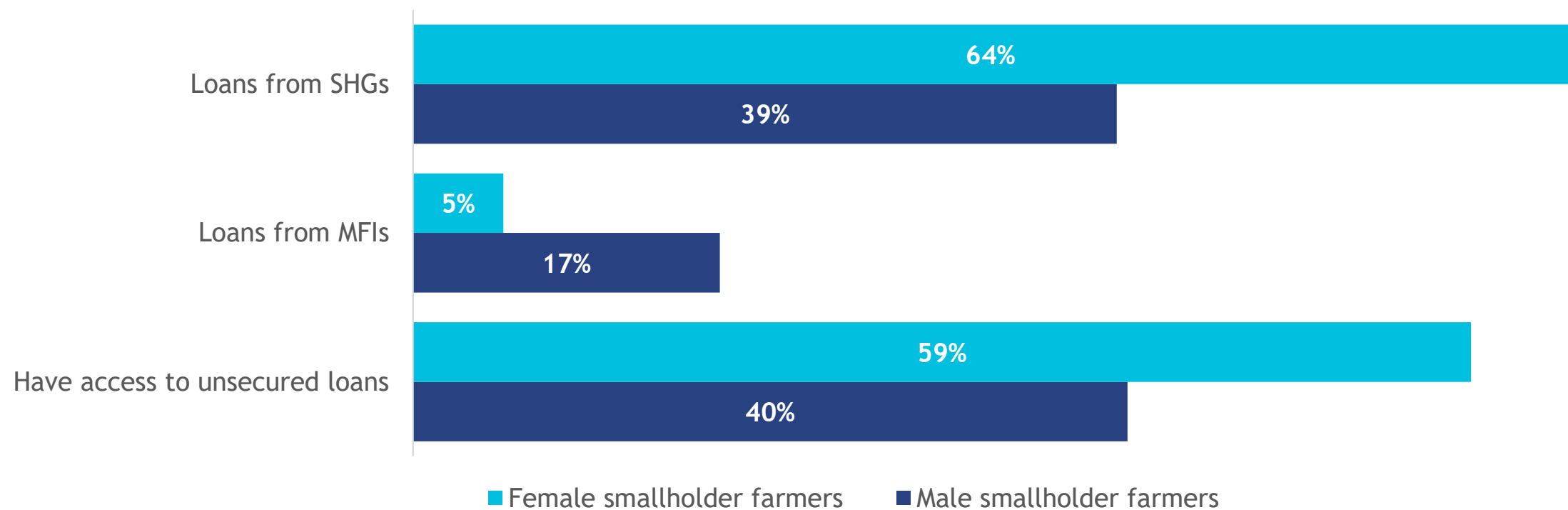


Figure 16: We observed that many female SHFs had access to unsecured loans. The reason can be attributed to the successful implementation of Bihar’s SHG-credit linkage model under the JEEViKA program. The fact that 64% of female respondents said they have access to SHG loans compared to only 5% who said they borrow from MFIs indicates that the female respondents who comprise the sample are SHG members. Therefore, they do not usually borrow from MFIs.

Comparison of SHFs and microfinance borrowers' access to livelihood capital



A higher percentage of Bihar’s microfinance borrowers adopt diversification as a resilience strategy



However, based on our survey of 571 Bihar’s SHFs, we infer this group has remained beyond the microfinance sector’s reach. High operating costs and high delinquency levels, often triggered by debt waiver programs, are the major reasons the microfinance sector has less than adequate credit exposure for SHFs. However, with the advancements in digital technologies, several AgriTech players can channel finance to the agriculture sector.

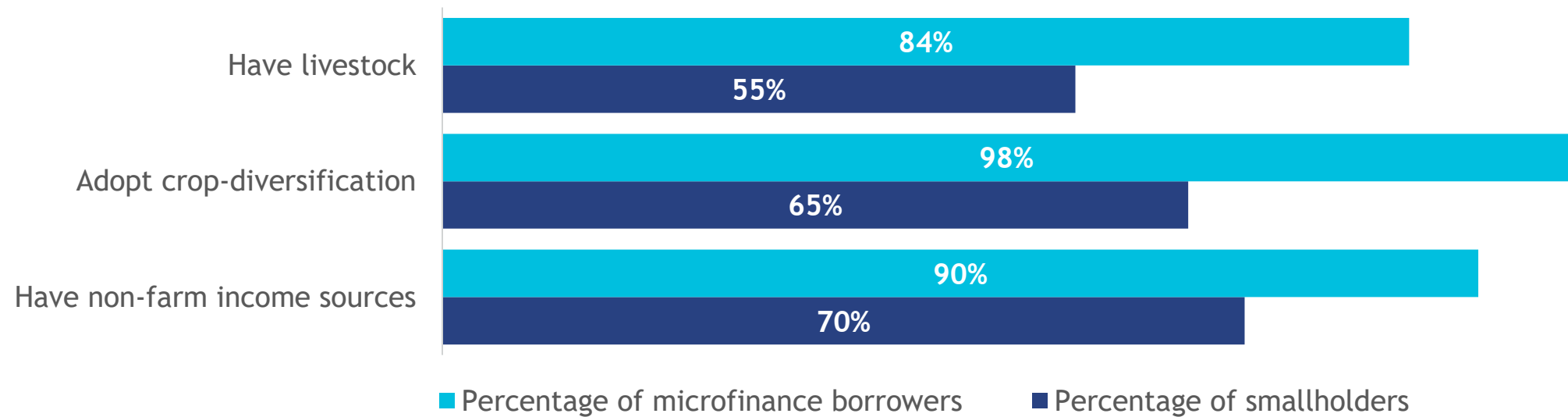


Figure 17: We observed that more microfinance borrowers adopted livelihood diversification measures than SHFs. The observed differences in percentages are statistically significant. Therefore, we infer that microfinance helps and motivates people who experience poverty to:

- a) Own assets, for example, livestock;
- b) Adopt risk-hedging strategies, such as crop diversification;
- c) Explore and access additional sources of income from non-farm sectors.

A higher percentage of microfinance borrowers have access to livelihood assets than SHFs



Therefore, we infer that the microfinance sector can partner with the AgriTech sector to unlock opportunities to serve the SHF segment, which has a higher need for access to critical livelihood assets.

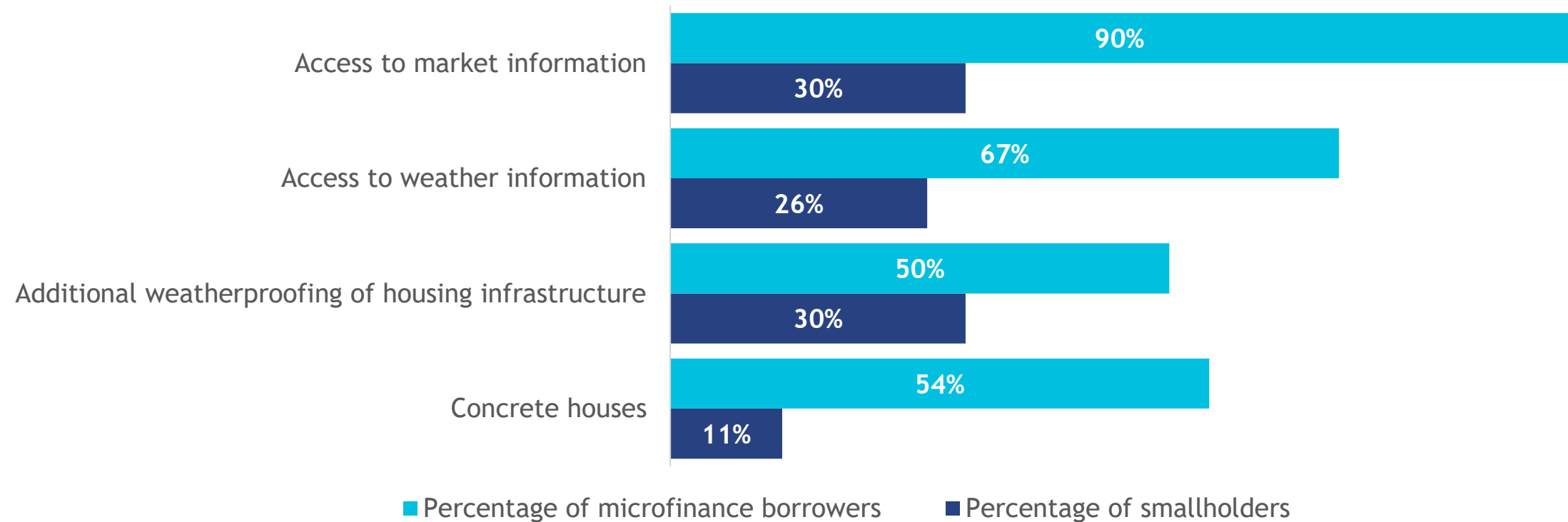


Figure 18: Many microfinance borrowers have access to livelihood assets, such as concrete (*pucca*) houses. Moreover, the percentage of microfinance borrowers with access to weather and market information is significantly higher than that of SHFs.

The financial behavior of microfinance borrowers differs from that of their smallholder counterparts

The percentage of microfinance borrowers who use crop and livestock insurance is much lower than that of SHFs who use these insurance products. Based on our extensive experience in the inclusive finance sector, we believe that the actual adoption of crop and livestock insurance among microfinance borrowers may be higher than what the respondents reported. The respondents are likely unaware that they are enrolled in an insurance program. This is because most microfinance institutions often bundle insurance products with loans.

For instance, Pahal Financial Services Private Limited, a microfinance lender, covers all cattle loans under a livestock insurance plan. The insurance premium is high, at 7% of the loan amount. To put this in perspective, the insurance premium is seven times the processing fees and accounts for 40% of the interest cost on these loans. Instead of collecting the insurance premium upfront from borrowers, the lender spreads it over the entire loan tenure.

As a result, borrowers may not realize that they have obtained insurance coverage.

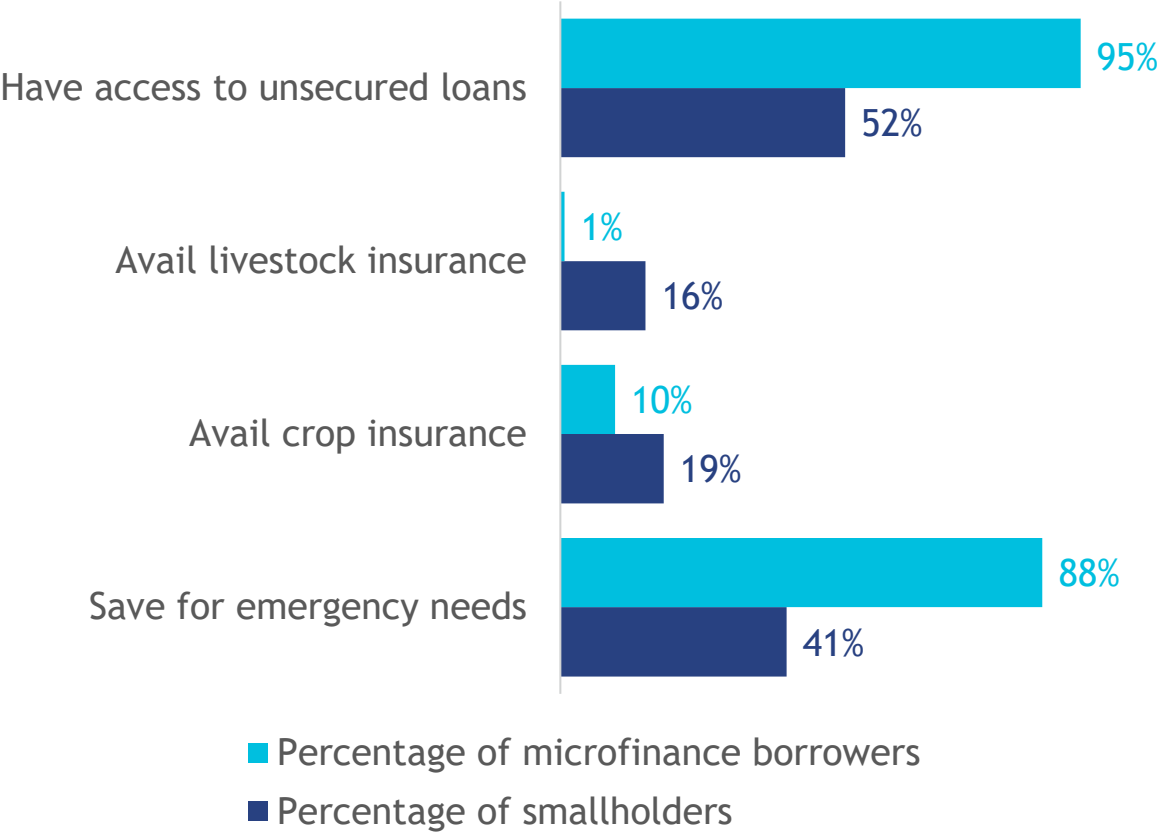


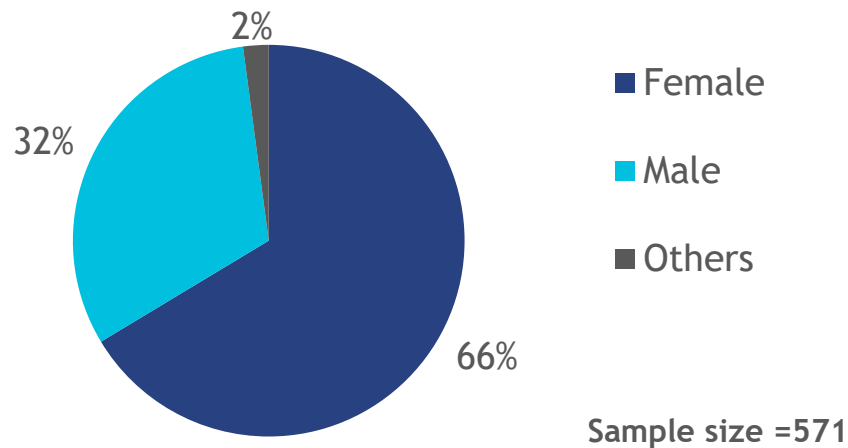
Figure 19: The percentage of microfinance borrowers who saved for emergency needs is more than double the percentage of SHFs who saved for emergencies. The higher income surplus and financial literacy imparted by microfinance institutions may be among the reasons why a higher percentage of microfinance borrowers tended to save for emergency needs.



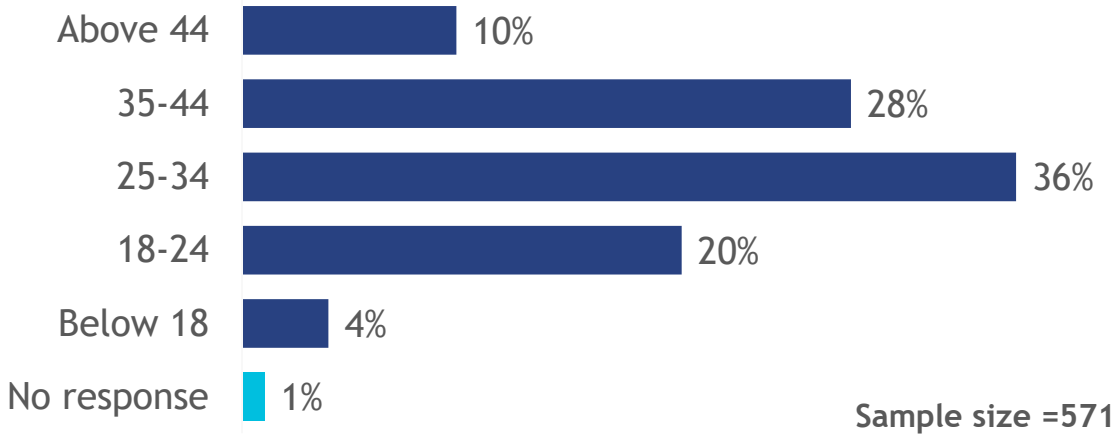
Annexes

Annex 1: Demographic distribution of the survey sample

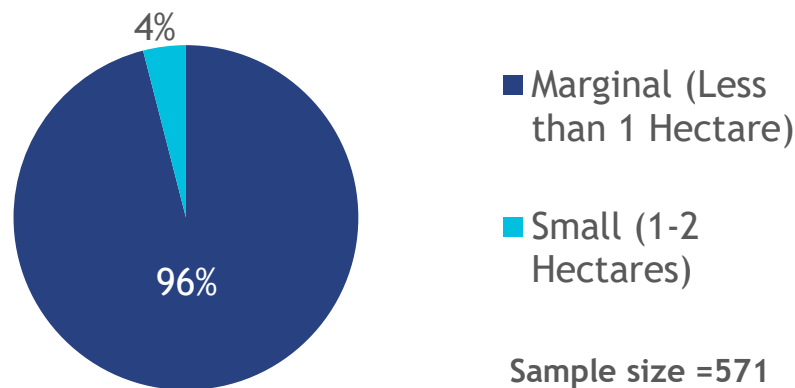
Gender distribution of respondent sample



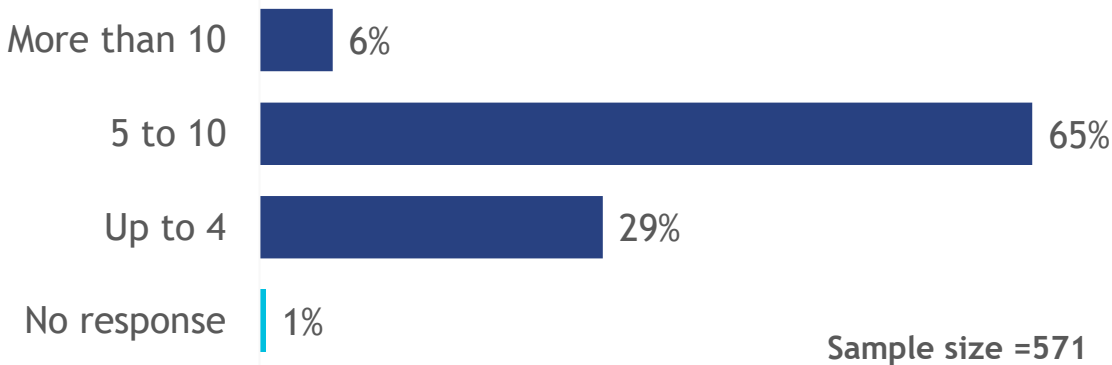
Age group-wise distribution of respondent sample



Land ownership-wise distribution of respondent sample



Distribution of respondent sample based on the number of household members



Annex 2: Survey design and techniques

Survey method:

Questions with multiple and binary (yes or no) options.

Number and types of questions:

Total number of questions = 31

1. Name;
2. Two qualifying questions;
3. Three profiling questions;
4. Nineteen questions to seek the availability or unavailability of the selected livelihood assets;
5. Six questions to understand the sources of availability and reasons for unavailability of the selected livelihood assets.

Interview technique: Interactive voice response-based questions

Response collection method: Keypad entry based on options provided via IVR.

Sampling technique: Our survey partner, Gram Vaani, randomly selected the respondents from their existing pool.

Survey duration: One month, between May and June 2023.

Research elements:



Total number of respondents surveyed = 603



Number of respondents who answered all the questions = 571



Respondent qualification criteria:

1. Is a farmer (undertakes farming themselves)
2. Owns less than two hectares of arable land

The survey was broken into four sessions to ensure that more than 90% of respondents completed the survey.

Annex 3: Explanation of the statistical test used to compare the sample proportions of microfinance borrowers and SHFs



We used a two-tailed Z-test to compare the percentage of microfinance borrowers and SHFs with access to livelihood assets. The following example explains the statistical test:

- Tested parameter: Access to non-farm income sources;
- Percentage of SHFs with access to non-farm income sources (MSC's sample; $n_1 = 571$): 70% (P_1);
- Percentage of microfinance borrowers with access to non-farm income sources (Pahal's sample; $n_2 = 100$): 90% (P_2);
- Null hypothesis: $H_0: P_1 = P_2$. Alternate hypothesis: $H_a: P_1 \neq P_2$;
- Level of significance: $\alpha = 0.05$;
- The Z statistic value at a 5% level of significance or 95% confidence level is ± 1.96 ;
- The computed Z value for the above sample is - 4.20;
- Therefore, the null hypothesis is rejected. This implies that the percentage of microfinance borrowers with access to non-farm livelihood sources differs from that of SHFs with access to non-farm livelihood sources.

Annex 4: References of studies that revealed the impacts of climate change on SHFs



- The/Nudge Institute, Smallholder Farmers & Climate Change, Voices from the Field, June 2023.
- IPCC_AR6_WGII_Chapter05.pdf
- The future of smallholder farming in India: Some sustainability considerations - CGIAR
- Farmers Share Their Vision for Tomorrow | Bayer Global
- Environmental Challenge due to Climate Change in Bihar, Developing State of India
- Are Multidimensional Poor more Vulnerable to Climate change? Evidence from Rural Bihar, India | Request PDF (researchgate.net)

Sectors we work in

Providing impact-oriented business consulting services



Banking, financial services, and insurance (BFSI)



Water, sanitation, and hygiene (WASH)



Government and regulators



Micro, small, and medium enterprise (MSME)



Social payments and refugees



Youth



Gender equality and social inclusion (GESI)



Education and skills



Digital and FinTech



Agriculture and food systems



Climate change and sustainability



Health and nutrition

Multi-faceted expertise

Advisory that helps you succeed in a rapidly evolving market



Policy and strategy



Products and channels



Research and analytics



Organizational transformation



Digital technology and channels



Catalytic finance



Design thinking and innovation



Marketing and communication



Training



Government and regulations and policy



Data Insight



Customer protection and engagement for responsible finance

MSC is recognized as the world's local expert in economic, social and financial inclusion



International financial, social and economic inclusion consulting firm with **25+** years of experience



>300 staff in **10** offices around the world



Projects in **~68** developing countries

Our impact so far

>550
clients

>1,400
publications

Assisted development of digital G2P services used by
>875 million people

Implemented
>950 DFS projects

Developed
>300 FI products
and channels now used by
>1.7 billion people

Trained >11,100
leading FI specialists globally

Some of our partners and clients





[MSC corporate brochure](#)

Contact us at info@microsave.net

Asia head office

28/35, Ground Floor, Princeton Business Park,
 16 Ashok Marg, Lucknow, Uttar Pradesh, India 226001
 Tel: +91-522-228-8783 | Fax: +91-522-406-3773 | Email: manoj@microsave.net

Africa head office

Landmark Plaza, 5th Floor, Argwings Kodhek Road
 P.O. Box 76436, Yaya 00508, Nairobi, Kenya
 Tel: +254-20-272-4801/272-4806 | Email: anup@microsave.net

