



RESEARCH PROGRAM ON  
**Climate Change,  
Agriculture and  
Food Security**



# **Comparative analysis of CCAFS household surveys for South Asia**

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# Introduction

In 2010/2011 and 2019, the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) conducted baseline and midline household, village and organizational surveys across five regions. In South Asia, the surveys took place in four sites, namely in Karnal and Vaishali districts in India, Bagerhat in Bangladesh and Rupandehi in Nepal. The baseline surveys were administered in 2010/2011 while the midline surveys were conducted in 2019.

For the household surveys' purpose, a longitudinal design was applied with the same 140 households selected from each site interviewed for both the baseline and midline surveys. This report analyzes changes reported in agricultural practices between the baseline household survey and the midline survey.

## 1. Demographic changes from 2010 to 2019

### 1.1. Family size

Family sizes have increased in both Indian sites, namely in Karnal and Vaishali, but have decreased in Bagerhat, Bangladesh. There are no significant changes noticed in family sizes in Rupandehi, Nepal.

**Table 1. Change of family size**

Family size, % of Households		1-4 (small family)	5-8 (medium family size)	9-12 (large family size)	>12 (Extended family size)
Karnal	Baseline	40	46	10	4
	Midline	24	59	14	2
	Change	-16	13	4	-2
Vaishali	Baseline	24	55	14	6
	Midline	18	58	18	6
	Change	-6	3	4	0
Bagerhat*	Baseline	11	74	15	0
	Midline	41	56	2	0
	Change	30	-18	-13	0
Rupandehi	Baseline	17	12	0	0

Midline	16	11	0	0
Change	-1	-1	0	0

\*1-3 members (Small family); 4-6 members (Medium family); 7+ members (Large family)

## 1.2. Highest level of education within the household

Education levels have increased in all sites. There are significant changes in the share of households with at least one member attaining secondary or post-secondary education.

**Table 2. Change in highest level of education**

Highest level of education of any resident household member (% of households)		No formal education	Primary	Secondary	Post-secondary
Karnal	Baseline	2	14	41	43
	Midline	1.4	0.7	48.2	49.6
	Change	-0.6	-13.3	7.2	6.6
Vaishali	Baseline	9	26	36	29
	Midline	2.2	15	51.4	31.4
	Change	-6.8	-11	15.4	2.4
Bagerhat	Baseline	3	17	51	29
	Midline	2.86	15	47.14	35
	Change	-0.14	-2	-3.86	6
Rupandehi	Baseline	2	23	52	23
	Midline	2	22	26	50
	Change	0	-1	-26	27

## 1.3. Changes in the distribution of surveyed respondents

The number of female respondents has increased in all midline surveys. This was especially noticeable in Bagerhat followed by Rupandehi.

**Table 3. Change in respondents by gender**

% of households		Male	Female
Karnal	Baseline	82	18
	Midline	78	22
	Change	-4	5
Vaishali	Baseline	70	30
	Midline	68	32
	Change	-2	2
Bagerhat	Baseline	69	31

	Midline	52	48
	Change	-17	17
Rupandehi	Baseline	74	26
	Midline	66	34
	Change	-8	8

## 2. Changes in farming practices

### 2.1. Adaptability/Innovation index

This index is computed based on the number of changes in farming practices that a farmer reported in the last 10 years preceding the baseline and in the last 7 years preceding the midline. During the baseline study, most of the farmers in Karnal and Vaishali were noted to have a high level of adaptability, whereas in the other two South Asian sites – Bagerhat in Bangladesh and Rupandehi in Nepal, the farmers were reported to have an intermediate level of adaptability. Nevertheless, all surveyed farmers have made changes between the two surveys period which depicts their proactive attitudes towards building resilience to climate change.

**Table 4. Per cent of surveyed households reporting changes to their agricultural practices in the last 10 years (for baseline) and 7 years (for midline).**

% of households	Adaptability/Innovation Index	0 = 0 or 1 change made (low level)	1 = 2-10 changes made (intermediate level)	2 = 11 or more changes made (high level)
Karnal	Baseline	9	4	87
	Midline	48.9	51.1	0
	Change	39.9	47.1	-87
Vaishali	Baseline	7	6	87
	Midline	66	34	0
	Change	59	28	-87
Bagerhat	Baseline	3	74	23
	Midline	NA	NA	NA
	Change	NA	NA	NA
Rupandehi	Baseline	2	50	48
	Midline	47	53	0
	Change	45	3	-48



## **2.2. Changes in input use and credit**

Input use has been measured from the reported inputs purchases made by farmers during the year preceding the baseline survey and the year preceding the midline. In Karnal, the number of households which purchased improved seeds, fertilizer, pesticides, veterinary medicine and credit have declined while purchases of crop and livestock insurance, weather-based insurance and organic fertilizers have increased. This points out the increased awareness among farmers on the impact of climate change on agricultural production. Yet, in Vaishali, the number of households purchasing improved seeds, fertilizer, crop and livestock insurance, as well as weather-based insurance has decreased while that of pesticides, veterinary medicine, organic fertilizer as well as credit for agricultural activities have increased. In the case of Bagerhat and Rupandehi, the proportion of households purchasing improved seeds has increased significantly, followed by purchases of credit and pesticides. In Rupandehi, 20 % of households reported the purchase of organic fertilizers during the midline survey, contrary to it not being reported at the time of the baseline.

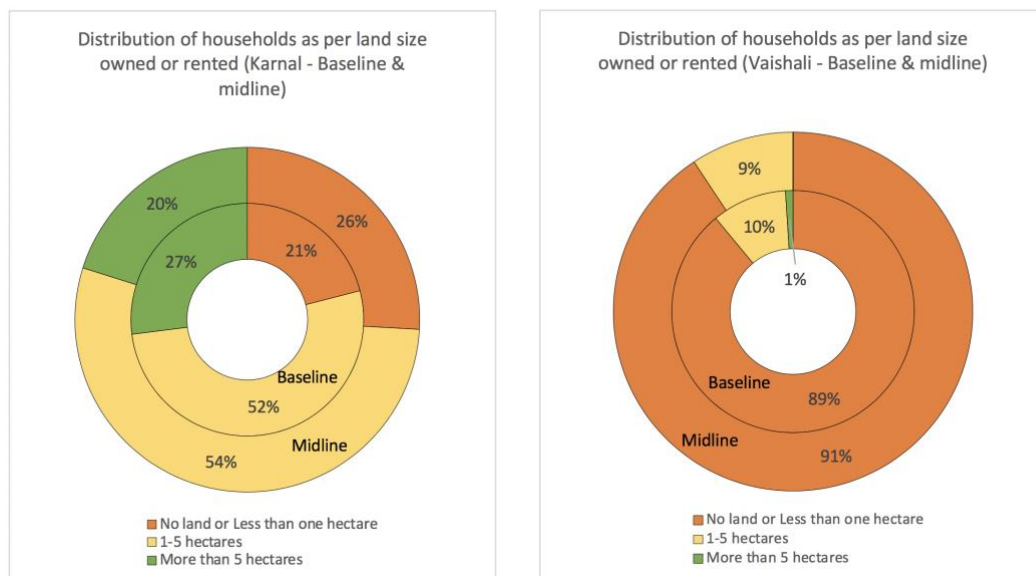
**Table 5. Percentage of households reporting purchase of agricultural inputs at baseline and midline**

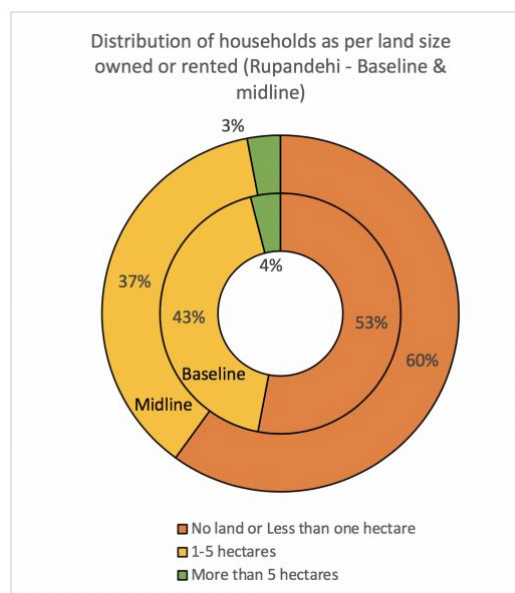
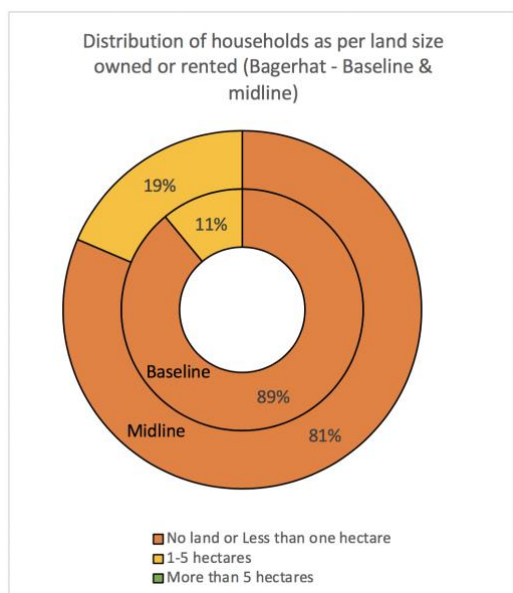
In the last year, did you purchase:	Baseline	Midline	Baseline	Midline	Baseline	Midline	Baseline	Midline	Change			
	Karnal		Vaishali		Bagerhat		Rupandehi		Karnal	Vaishali	Bagerhat	Rupandehi
Certified/Improved seeds	89	78	91	87	33	77	61	96	-11	-4	44	35
Fertilizer	90	78	91	90	73	80	100	96	-12	-1	7	-4
Pesticides	90	79	77	90	73	77	87	95	-11	13	4	8
Veterinary medicine	87	81	51	76	80	70	71	70	-6	25	-10	-1
Any credit for agricultural activities	51	42	16	51	7	14	4	20	-9	35	7	16
Insurance for crop and livestock	4	18	5	4		1		4	14	-1	1	4
Weather based insurance	3	13	4	1		1			10	-3	1	0
Organic fertilizer		26		42				20	26	42	0	20
None of the above	7		7						-7	-7	0	0

### 2.3. Land use

In terms of land ownership, farmers in Karnal are better off as a significant proportion of farmers own land. At the time of the baseline, 52% of the farmers in Karnal owned 1 to 5 hectare (ha) of land while 27% of the farmers owned more than 5 ha of land. During the midline, 54% of farmers reported owning 1 to 5 hectares of land while 20% owned more than 5 ha of land. However, in Vaishali, 89% of households did not own or owned less than 1 ha of land with the share increasing to 91% at the time of the midline. A similar scenario can be observed in Bagerhat as 89% of households reporting not owning or owning less than 1 ha of land at the time of the baseline. This share had, however, decreased slightly to 81% in midline. The situation is relatively better in Rupandehi as 3% of the households own more than 5 ha of land in midline, while 37% of the households own between 1 to 5 ha of land with the remaining 60% being either landless or owning less than 1 ha of land.

**Figures 1-4. Distribution of households as per land size owned or rented**





### 3. Livelihood diversification

#### 3.1. Changes in sources of cash income other than from the farmers' own farm

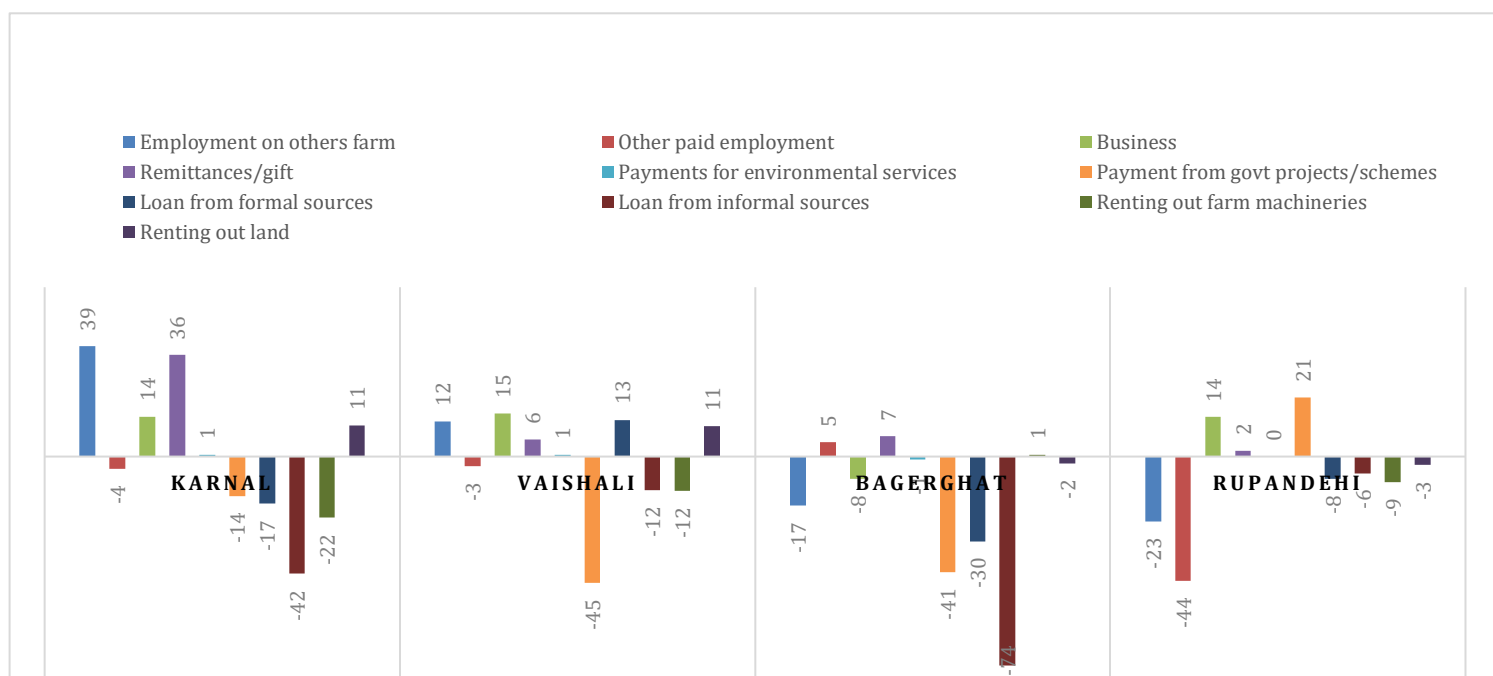
There is an increase of 39% in the proportion of surveyed households in Karnal reporting earning cash income from employment on others' farms along with an increase by 36% of farmers receiving remittances/gifts. The share of households resorting to loans from informal sources has decreased by 42%.

In Vaishali, an increase is noted in the proportion of households earning cash income from businesses by 15%, as well as an increase by 13% of cash coming from formal loans and an increase by 12% of reported income coming from employment in others' farm. There is a, however, a substantial decline, by 45%, in the share of households receiving an income from government projects and schemes.

Bagerhat witnessed a slight increase in the proportion of households receiving a cash income from remittances/gifts and other paid employment, by 7% and 5% respectively. There is a significant decline in the share of households resorting to loans from informal sources (74%) and formal sources (30%), as well as receiving payments from government schemes (41%), and employment on others' farm (17%).

While all the other sites are experiencing a decline in payment from government projects/schemes, the findings show that in the case of Rupandehi, the share of households receiving payment from this source has increased by 21%. The share of households generating an income from businesses has also increased by 14%. However, there is a decline in the number of households earning an income from other paid employment (44%) and from employment on others' farm (23%).

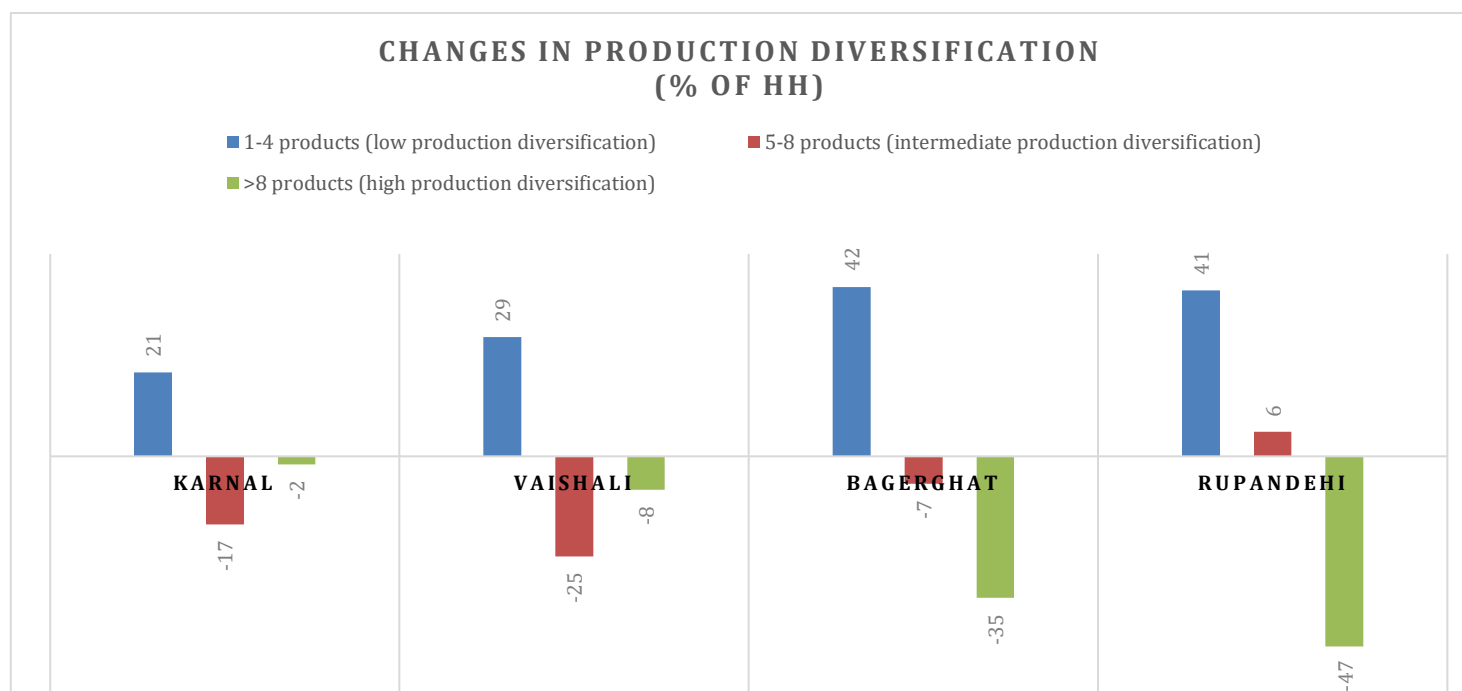
**Figure 5. Changes in sources of cash income other than from own farm (% of households)**



### 3.2. Product diversification index

Agricultural production is not highly diversified in all the South Asian sites with the findings pointing out a trend towards lower production diversification in all sites.

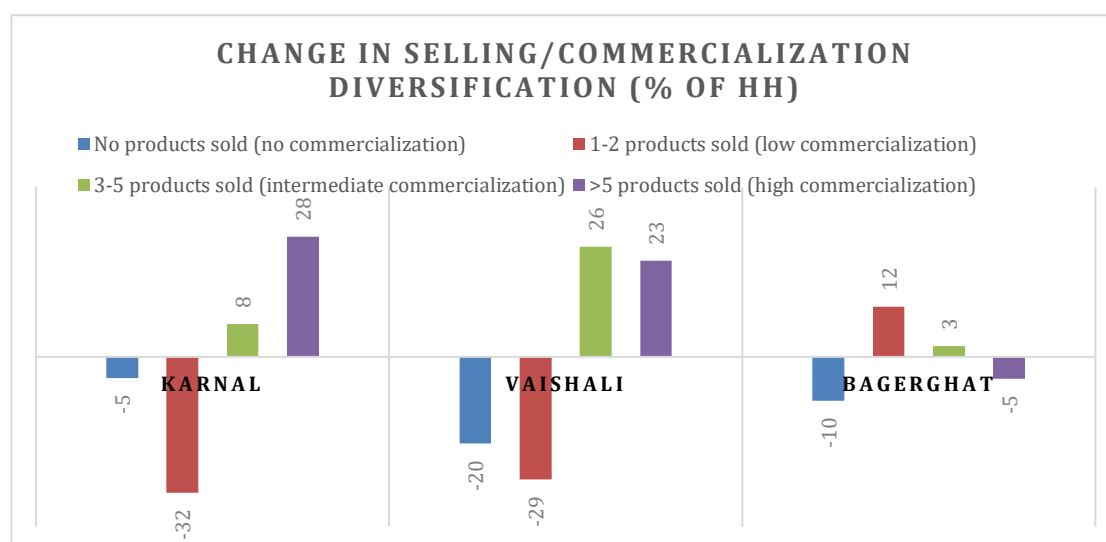
**Figure 6. Changes in production diversification (% of households)**



### 3.3. Commercialization diversification index

The findings are more balanced when it comes to changes in the commercialization diversification index. A substantial decline in no and low commercialization index numbers with an increase in intermediate and high commercialization diversification was noted in Karnal and Vaishali. This suggests an upward trend in the Karnal and Vaishali with households selling more of their products and earning additional income through the sales. However, in the case of Bagerhat, the increase is only towards low and intermediate commercialization index number which indicates that farmers have started to commercialize their products more but that the beginnings remain modest.

Figure 7. Change in selling/commercialization diversification (% of households)



## 4. Organizational membership

There is a significant proportion of households reporting no membership in any of organizational groups in Karnal, Vaishali and Bagerhat. Among those who are members of organizations, most of them belong to a saving or credit group in both Karnal and Vaishali, while in Bagerhat, the fishpond group is now the most popular. In Rupandehi, 85% of the households indicated belonging to saving or credit group during the baseline survey. This proportion declined to 59% of households during the midline.

Table 6. Percentage of households belonging to groups

% of HH	Baseline	Midline	Baseline	Midline	Baseline	Midline	Baseline	Midline
Any family member belongs to the following group:	Karnal		Vaishali		Bagerhat		Rupandehi	
Soil, land, water management improvement activities group	3	8.6	-	12.86	-	1.43	2	23
Savings or credit group	4	31.7	24	81.43	4	0.71	85	59
Agricultural product marketing group	4	-	40	-	-	-	2	4

Productivity enhancement group	16	-	-	-	-	0.71	-	-
Vegetables production group	1	1.4	-	0.71	-	2.86	6	22
Fish pond group	-	-	-	0.71	1	15	-	-
Water catchment group	-	1.4	-	-	1	-	-	-
Seed Production group	-	-	-	2.14	-	0.71	1	2
Tree nursery/tree planting	-	0.7	-	2.14	-	6.43	1	
Not a member of any group	76	65.5	50	-	94	-	11	25

## 5. Asset ownership

The results show an improvement in households' asset portfolio. There is a notable increase between the baseline and midline in the number of households possessing four or more assets in all sites.

Among the surveyed households in Karnal, most of the households reported owning a motorcycle. However, a drastic increase by 21% was noted in the number of households reporting owning a car or truck at the time of the midline. Ownership of production assets has, however, declined between the baseline and the midline.

Within energy assets, ownership of solar panel has increased by 1% while access to LPG has increased by 12%. Ownership of computer and access to the internet have also increased significantly by 11% and 49% respectively. There was also an increase in ownership of luxury assets such as AC or fan along with increased ownership of bank accounts.



**Table 7. Households' asset portfolio**

% of households	Karnal		Vaishali		Bagerhat		Rupandehi		Change			
	Baseline	Midline	Baseline	Midline	Baseline	Midline	Baseline	Midline	Karnal	Vaishali	Bagerhat	Rupandehi
Asset Index	Karnal		Vaishali		Bagerhat		Rupandehi		Karnal	Vaishali	Bagerhat	Rupandehi
0 = no assets (basic level)	0	0	4	0	10	0.71	0	1	0	-4	-9	1
1 = 1-3 assets (intermediate level)	5	1	27	9	69	50.71	22	2	-4	-18	-18	-20
2 = 4 or more assets (high level)	95	99	69	91	21	48.57	78	97	4	22	28	19

**Table 8. Asset ownership**

Asset ownership	% of HH	Baseline	Midline	Baseline	Midline	Difference	
		Karnal		Vaishali		Karnal	Vaishali
Transport Assets	Bicycle	66	63		81	-3	81
	Motorcycle	79	88	16	38	9	22
	Car/truck	29	50		4	21	4
Production assets	Tractor	46				-46	0
	Mechanical plough	42	30		0	-12	0
	Mill	4	4		3	0	3
	Water pump and treadle pump	72	42	10	21	-30	11
	Thresher	16	8		1	-8	1
Energy assets	Solar panel	4	5		2	1	2
	Generator	21	9		2	-12	2
	Battery (including inverter)	61	30		0	-32	0
	Biogas digester	4	1		1	-3	1
	LPG	84	96	15	88	12	73
Information assets	Radio	15	2	21	7	-13	-14
	Television	94	99		57	5	57
	Cell phone	99	99	82	91	0	9
	Computer	17	28		2	11	2
	Internet	9	58		29	49	29
Luxury assets	Refrigerator	81	94		9	13	9
	Air conditioner	18	35		0	17	0
	Electric fan	96	99		89	3	89
	Bank account	92	99	69	95	7	26

## 6. Weather-related information access

### 6.1. Percentage of households receiving weather-related information

Households in Karnal report a decline between the baseline and midline with regards to access to information related to the start of rains, forecast of extreme events, forecast of pest or disease outbreak and general weather forecast. However, in Vaishali, 10% more households report receiving information related to the start of rain and 3% more receiving information related to the extreme event at the time of the

midline. The proportion of households receiving other climate related information has, however, declined. Similarly, 43% more households in Bagerhat report receiving weather forecast information during the midline. A decline in access to other types of information was noted. Only Rupandehi's surveyed households report an increase in access to all kinds of weather-related information.

**Table 9. Percentage of households receiving weather information**

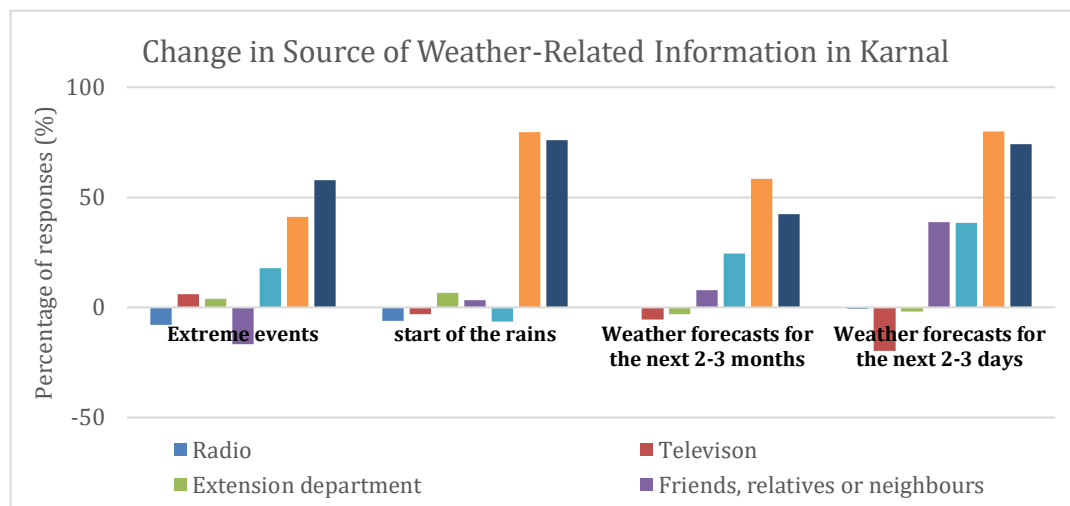
% of HH receiving:	Baseline		Midline		Baseline		Midline		Change			
	Karnal		Vaishali		Bagerhat		Rupandehi		Karnal	Vaishali	Bagerhat	Rupandehi
<b>Start of the rains</b>	80	52	44	54	11	1	0	16	-28	10	-10	16
<b>Forecast of extreme event</b>	64	12	28	31	64	59	0	2	-52	3	-5	2
<b>Forecast of pest or disease outbreak</b>	73	2	19	4	12	0	0	4	-71	-15	-12	4
<b>2-3 month weather forecast</b>	22	17	21	14	0	0	0	6	-5	-7	0	6
<b>2-3 day weather forecast</b>	36	18	34	6	51	94	71	81	-18	-28	43	10

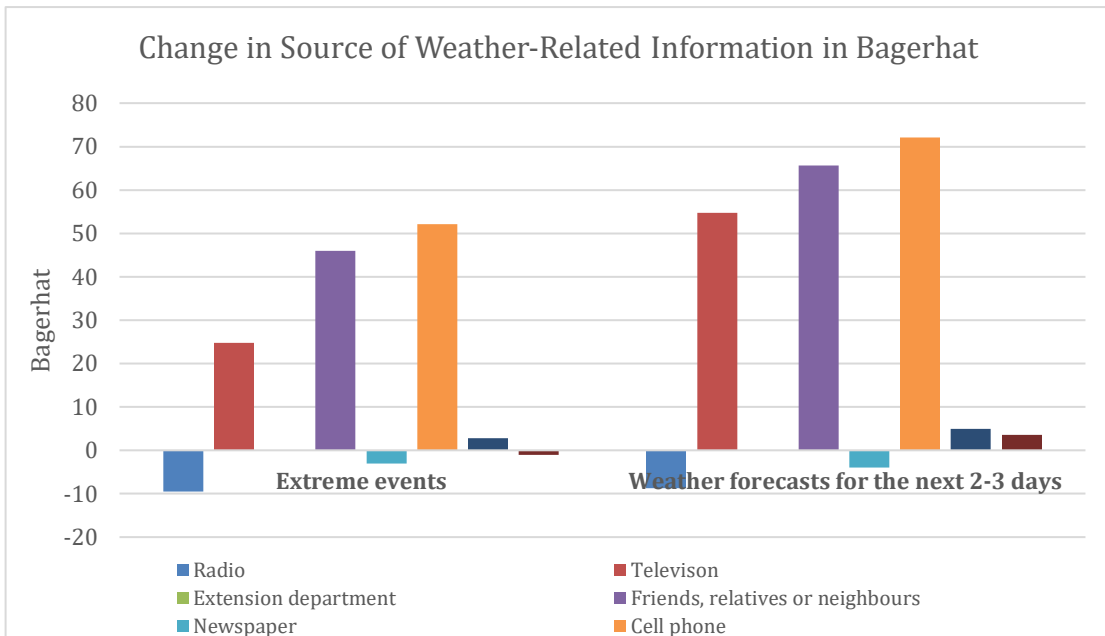
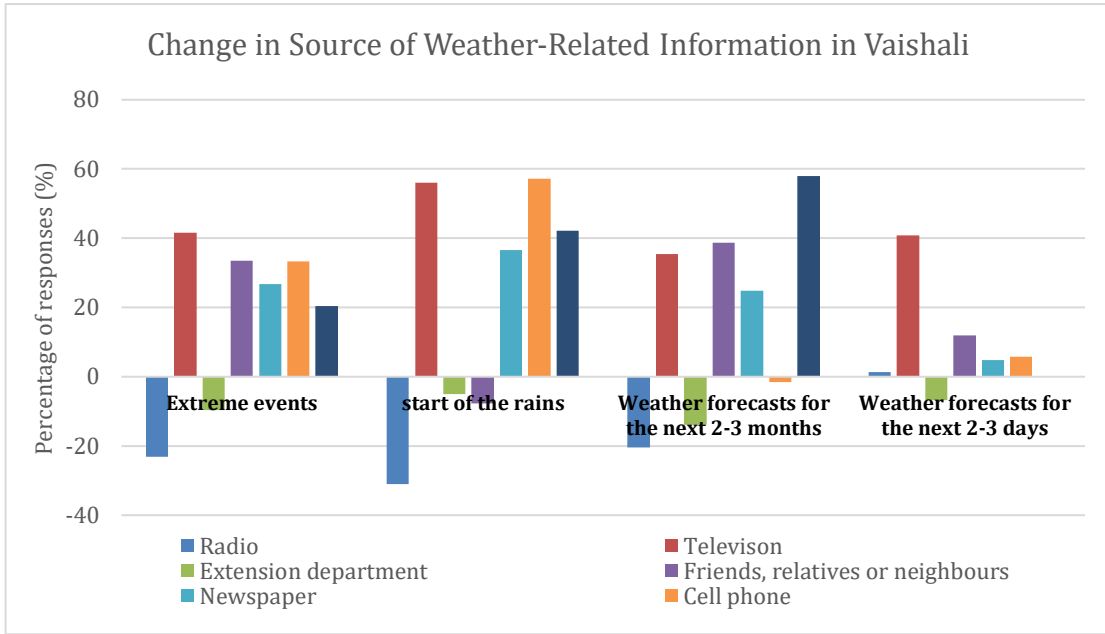
## 6.2. Source of weather-related information

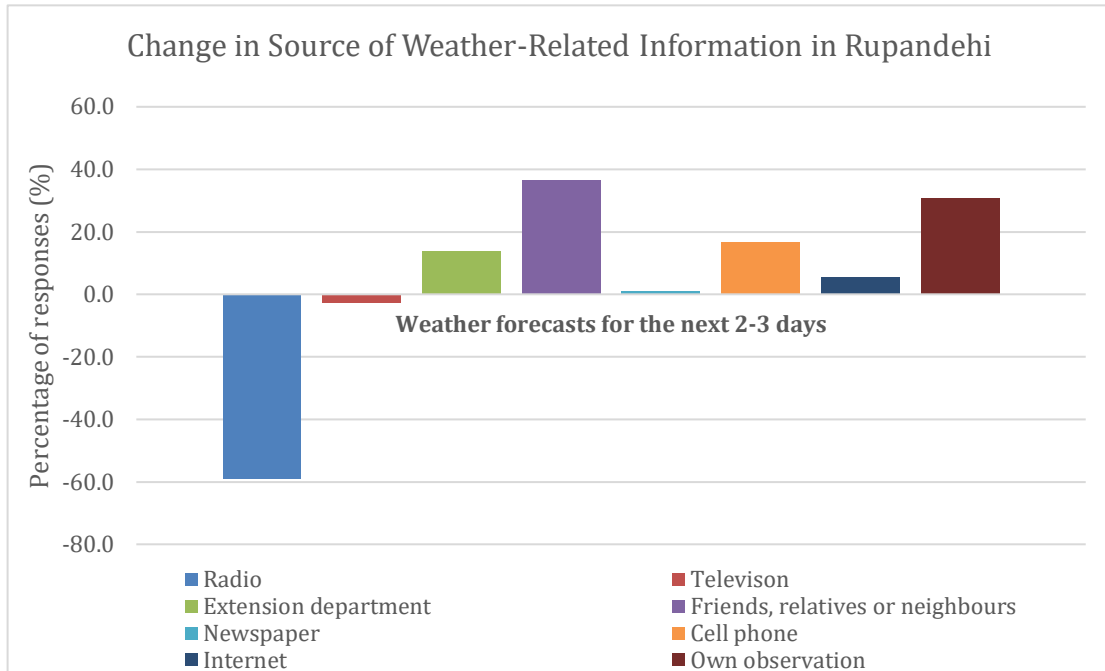
Cell phones and the internet are the two most important source of information for farmers in Karnal to access all types of weather-related information. However, households in Vaishali also report relying on television in addition to cell phones and the internet to access weather-related information. The use of traditional sources of information such as the radio has declined in both sites. Newspaper remain an important source of information with its usage increasing in both sites.

In Bagerhat, the use of cell phones to access weather-related information has also increased quite significantly, followed by friends, neighbors and television. In the case of Rupandehi, only information related to the weather forecast for the next 2-3 days is reported to be received by the surveyed households, for which they highly depend on either interaction with their neighbors and friends or on their own observation.

**Figures 8-11. Change in source of weather-related information in the sites**







## Conclusion

This report has compared data collected in 2010-11 during the baseline survey with the data collected in 2019 during the midline survey to analyze changes occurred in key areas of interest to CCAFS in South Asia. Regarding changes in key demographics of the households surveyed, an improvement in education levels was noted in all sites. The households surveyed also report a diversification of income sources, notably from off-farm employment and businesses.

Regarding farming practices, the comparative analysis shows that farmers are becoming more concerned by climate change's impacts on their agricultural output, as evident from a significant increase in the proportion of households in Karnal purchasing weather-based insurance, organic fertilizer in Karnal, Vaishali and Rupandehi, and improved seeds in Bagerhat and Rupandehi. Further, the estimated adaptability index shows that at the time of the baseline, most of the farmers in Karnal and Vaishali had a high level of adaptability and while farmers in Bagerhat and Rupandehi had an intermediate adaptability level. More changes in practices were reported during the midline survey, depicting farmers' proactive attitude towards building resilience to climate change. However, in terms of production diversification, agricultural production is not highly diversified in all four sites. Yet,

the households surveyed are moving towards increased commercialization of products which generates additional income, especially in the Karnal and Vaishali sites. There are also notable improvements in the surveyed households' asset portfolio. Significant improvements are especially visible in access to information and communication technology (ICT) with a drastic increase in the use of cell phones and internet to access weather-related information. Surveyed households in Vaishali have become more informed on rain forecasts and extreme events while households in Bagerhat are now accessing more weather forecast information. Only in Rupandehi has the proportion of households receiving all listed types of weather-related information increased.

Overall, the situation of surveyed households in all the South Asian sites has improved between the baseline and the midline study. Not only are farmers more aware of climate change, they have also implemented many new agricultural practices that will help them adapt to climate change. For the Indian sites – Karnal and Vaishali - a significant portion of the positive trends observed can be attributed to the implementation of various government schemes such as the Pradhan Mantri Krishi Vikas Yojana (PMKVY), the Pradhan Mantri Fasal Bima Yojana, the Weather-Based Insurance Scheme, the agricultural contingency plans, etc. Karnal, in particular, is relatively better placed as it has better agricultural infrastructures, better connectivity in terms of ICTs, more land under irrigation, and better farm production and thus, sources of farm income. Nevertheless, the Vaishali, Bagerhat and Rupandehi sites have also shown good progress in terms of education levels, commercialization of agricultural products, availability of information and possession of assets.