Gender Knowledge for Mitigating Climatic Risks

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Background

In India, more than 60% of the crop area is rain-fed, making it highly vulnerable to climate-induced changes in precipitation patterns

All India total number of events has increased significantly from about 30 in year 1930 to about 358 in the year 2010

It is estimated that by the 2050s, with a temperature increase, water for agricultural production will reduce further and may impact food adequacy for some 63 million people

In India, state of Bihar is highly vulnerable to hydro-meteorological natural disasters, being both drought and flood

Out of 38 districts, 28 districts are flood prone with major flood events occurring in 2004, 2007, 2011, 2013, Further, the years 2012, 2014 and 2015 were no better than the drought years because Bihar experienced irregular and erratic rainfall during these years

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Objective and Methodology

Objectives

- Assess determinants defining CSAPs adoption among men and women
- Capture farmers' responses to climatic risk and mitigation through CSAPs adoption.
- Gender knowledge gap analysis for strategic interventions

Methodology:

- Gender-segregated primary data was collected for 200 respondents comprising of 10 HH from each village from districts of Samastipur and Vaishali, Bihar, India.
- Both adopters and non-adopters from 10 Climate smart villages were interviewed
- STATA 13.1 is used for data analysis using Principle Component to construct an index for CSAP knowledge, yield and income index. .

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Impacts of Climatic Risks

CLIMATIC RISKS

CROP LOSS

INCOME LOSS
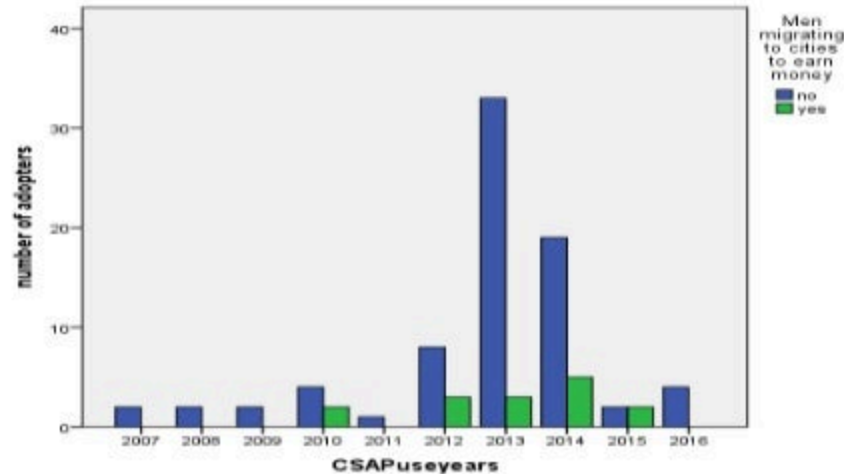
MIGRATION

FEMINIZED AGRICULTURE

- Bihar's agriculture sector employs 50.1% of the total workforce engaged in farming being women.
- 70% of all women engaged in cultivation are from households witnessing migration
- Recommended capacity building for gender equality

CCAFS Flagship 2 Project: Scaling CSVs

Climate smart agriculture practices (CSAPs) promoted for climatic risk mitigation ensuring sustainable agriculture

CSAPs Adoption and Migration

Status of Migration
- There are more adopters in the middle years from 2012-14
- Out of total adopters there are 83.6 % farmers who did not migrate and of the total not migrating 77.9% farmers are from 2012-14 periods.

Is migration successful: Income of the migrants
- Types of occupations they are involved.
- Duration of the job available.
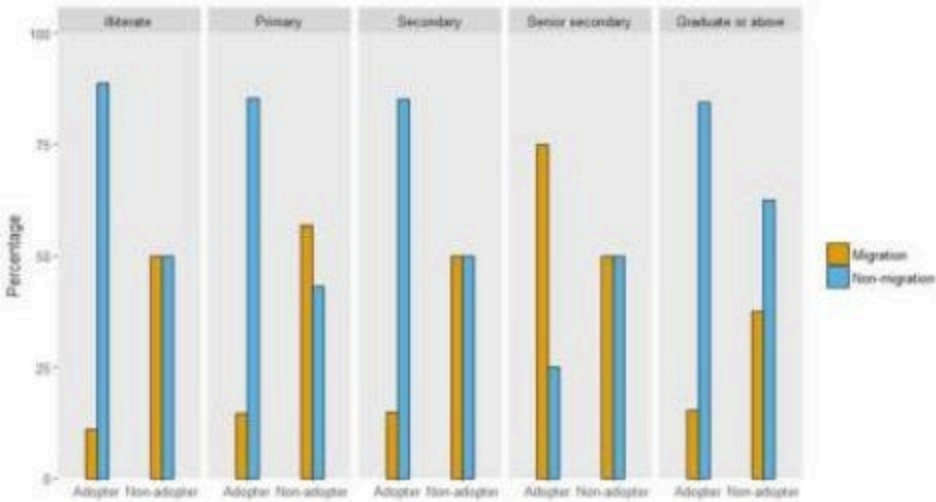- Personal endowments such as level of education, skill, years of experience,

CSAP's

**How to curtail migration? Profitable business opportunities**
- High income
- Low cost techniques
- Farmer friendly

Adopters are less likely to migrate compared to non-adopters.

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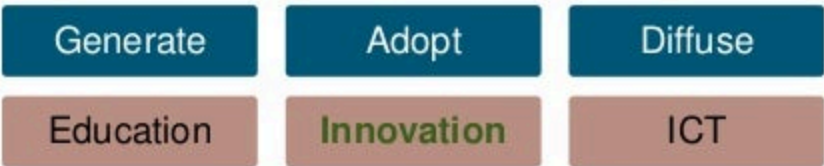
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Role of Education in Adoption and Migration

- Irrespective of education level, adopters are less likely to migrate.
- With primary education 85.4% of adopters are not migrating and 56.8% non-adopters are migrating
- Farmers with higher education are more likely to adopt and not migrate as they are in better position to understand the benefits of CA.

Bihar Literacy Level

53.3   73.4

2011 census
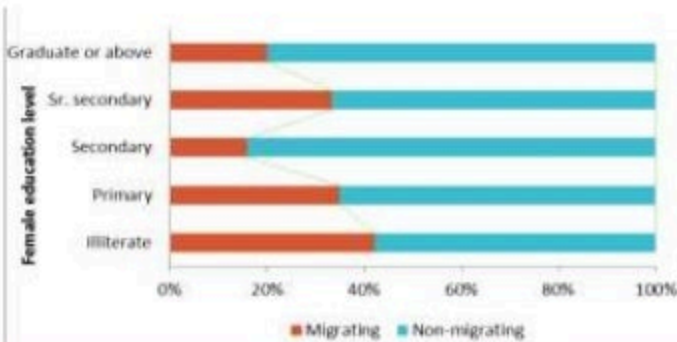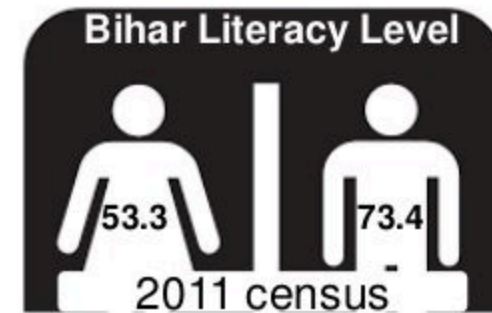
Migration
Graduate: 20.0%
Illiterate: 42.1%

No-migration
Primary: 65.1%
Secondary: 84.2%

World Bank Knowledge Index (India:109/145)

Generate	Adopt	Diffuse
Education	Innovation	ICT

Climate Smart Agriculture Practices (CSAPs)

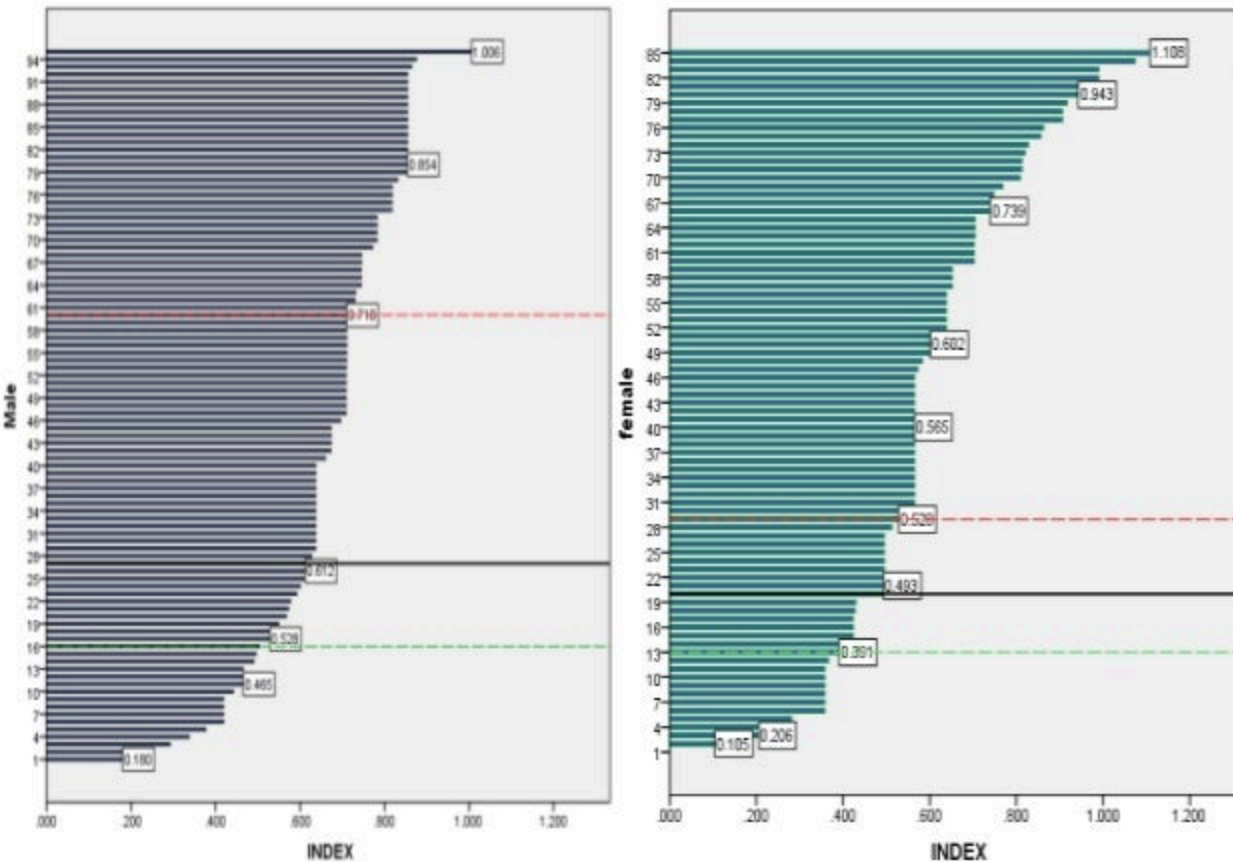| LLL	GS	ZT	Harvesting	NE	MCP

BP	LCC	RP

Reduce low paid migration.

Concentrating labour force in agri. & allied activities

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Gender Knowledge Index

Distribution of adopters and non-adopters around the average

Average Knowledge Index	Male	Female
Adopters	0.717	0.527
Non-adopters	0.614	0.388
Average	0.668	0.46

Male adopters are 1.36 times and 1.58 times more knowledgeable than female counterparts among adopters and non-adopters respectively
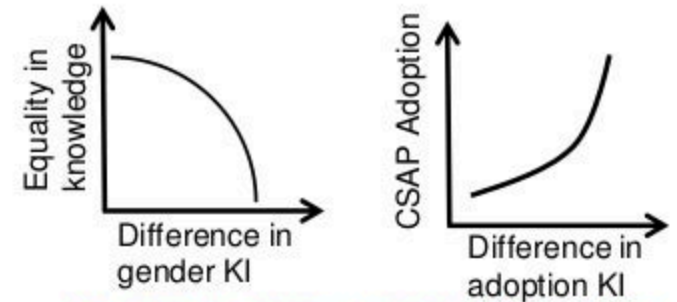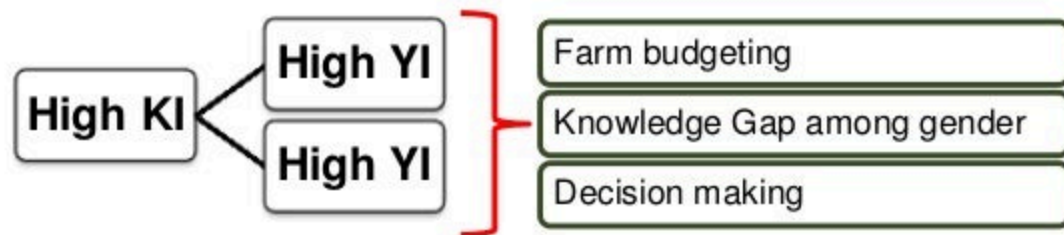

Strategic intervention to reduce gap in gender KI and promote CSAP adoption

KI	District Results	Strategy
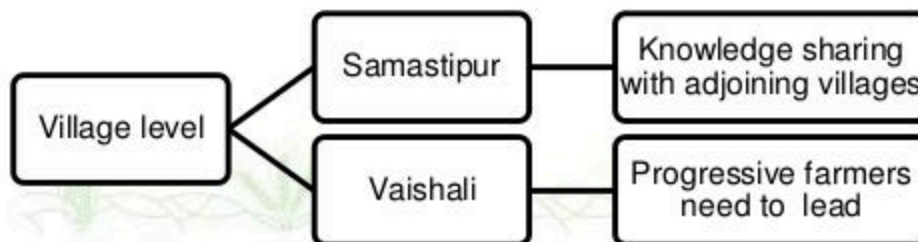
Yield and Income Index

	Yield Index	Income Index
Male	0.798736	0.671034
Female	0.685725	0.570959

High KI → High YI / High YI

- Farm budgeting
- Knowledge Gap among gender
- Decision making

Climate Smart technologies Knowledge Index

TECHNOLOGY	Female average KI	Male average KI	Male/female KI
Laser Land Leveller	0.06	0.135	2.25
Zero Tillage	0.061	0.083	1.36
Bed Planter	0.081	0.105	1.29
Harvester and Thresher	0.059	0.075	1.27
Multi crop Planter	0.201	0.384	1.91
Relay Planter	0.207	0.352	1.70
Green Seeker	0.092	0.142	1.54
Nutrient Expert Tool	0.07	0.125	1.78
Leaf Color Chart	0.098	0.162	1.65

- Multi-crop planter and relay planter: Good KI of both men and women but still show highest knowledge gap.
- Laser land leveller: Men have high KI as more technical
- Zero tillage, bed planting and harvesting: Better gender equity in KI as female farmers are more involved.
- Nutrient expert tool, Green seeker and LCC : Large knowledge gap but need to be targeted as more women friendly

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Food security

2731kcal is average per day per consumer unit intake in rural Bihar

Cereals
(61.64%) → 15% expenditure of total food expense

Thus any effect of climate change on the cereal production or consumption will majorly impact the food nutritional security

Under normal conditions we don't see a major difference in the nutritional intake within a HH.

The Production need to be safeguarded with efficient farming practices providing higher yield and income

Climatic risk impacted food security

Weights provided to food groups to equivalent to calories/100 grams (approx.)

Food Category	Pulses	Eggs	Meat	Vegetables	Cereals	Legumes	Fruits	SUM
WEIGHTS	300	130	450	30	330	320	50	1610

Adopters%   Non-adopters%
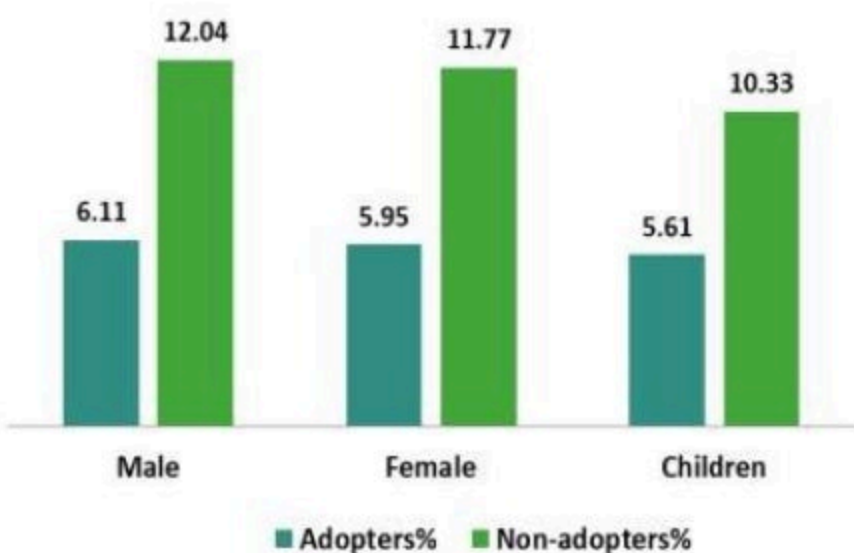
Reduced consumption more severe for non-adopters

- Being a major source of energy, cereals consumption is less affected among adopters as compared to non-adopters.
- Legumes are majorly affected among non-adopters
- Pulses, Vegetables and fruits are comparatively less affected among adopters

Ensured food security for the adopters as they experience higher yield and income making them mitigate risk in case of climatic adversities

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Factors Impacting CSAPs adoption

$$CSAP\ Adoption_{kd} = f(KI_{kd},\ Sufficient\ Training_{kd},\ HH\ Size_{kd},\ Alternative\ Livelihood_{kd},\ X_{kd})$$

Improvement in CSAPs knowledge leads to an increase in probability of CSAP adoption

There is an expected increase of 1.57 in the log-odds of adoption with every unit increase in knowledge index.

Adoption may be impacted by several other factors such as HH size, farmer literacy, policy, availability of training etc and imperative to include these to circumvent omitted variable bias.

Inclusion of other variables leads to an increase in probability of CSAP adoption with increase in knowledge index, indicating possible underestimation of the estimate in absence of the control variables.

Household size measured by the number of family members again indicates an increase in the log-odds of adoption. The estimate for the same is though small, however, remains positive and significant. More the number of family members more inclined is family towards adoption

The estimates on migration indicate that there is an increase in log-odds of CSAP adoption for migrating farmers as compared to non-migrating farmers. This shows impact of adoption to curtail migration.

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Factors impacting migration

$$Migration_{kd} = f(Adopter_{kd}, \; Female \; Literacy_{kd}, \; Nutrition_{kd}, \; X_{kd})$$

The results suggest that CSAP adoption has a negative significant impact on migration.

The results are significant and remain robust to inclusion of other variables.

CSAPs adoption reduces probability to migrate by 21%.

Increase in female literacy reduces probability to migrate reduces by 40%.

Probability to migrate increases by 50% with 1unit fall in nutrition. Results are found significant at 5%

Age has a negative impact on migration. The tendency to migrate reduces with age. There are more youth migrating, posing additional pressure of brain drain from agriculture.

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Factors impacting food security

$$Reduction\ in\ Consumption_{kd}$$
$$= f(CSAP\ Adoption_{kd}, Female\ Literacy_{kd}, Migration_{kd}, X_{kd})$$

CSAP adoption leads to a fall in reduced nutrition intake by 5.92 units.

The estimate is found to be significant and robust to inclusion of other controls such as age, household size etc.

Migration of men tends to increase the nutrition intake deficiency by almost 5 units. Previously shown that in case of food deficiency men migrate. This highlights the vicious cycle of food deficiency among migrating households. To break this cycle proper emphasis should be laid to address climatic risks and harness potential of women

Increase in land size also tend to reduce the decline in consumption and is robust at 5% level of significance. Thus large farmers are less impacted in case of climatic risks. To address the situation of smallholders CSAPs offers best interventions to secure HH food security.

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Thank you for your interest!