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# Gender-based Variations in Perception of Flood Impacts- A Micro Study

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**ABSTRACT**

An attempt to understand the perception of flood impacts through a gender lens was executed in 2022 in the purposively selected Darbangha district of Bihar as it tops the list of the districts most severely affected by flood in the state. Data from 120 farmers were collected through a focused group discussion and an interview schedule developed specifically for the study. The findings revealed that the maximum percentage of farmers had a medium perception regarding the impact of floods. Variations were seen in the perception of the socio-economic and psychological impact of flood with women perceiving slightly higher than men whereas the opposite was seen for the perception of the environmental impact of the flood where men perceived slightly higher than women. Factors like age, household headship, social participation, decision-making, education, and family size significantly and positively affected the perception women and men had on the impact of the flood. The findings provide an in-depth understanding of the perception of the impact of floods by men and women farmers in the study area which would help the extension agencies and policymakers to plan and design locale-specific preparedness.

## INTRODUCTION

Flood is the most prevalent and costliest natural disaster in the world which devastates life and economy on large extent. Globally, 44 per cent of disasters have been linked with floods (riverine floods 24%, general floods 14%) (WMO, 2021). Bihar is one of the most flood afflicted states in the nation, attributing to around 17.2 per cent of the flood prone area of the nation. 68,800 sq. km out of a total area of 94,160 sq. km, an approximate 73 per cent of the territory in Bihar is susceptible to flood (BSDMA). Annual floods and regular losses of agricultural production of wheat, rice, corn, and mango continue to have an impact on the state's food supply as well as employment opportunities (Kumar et al., 2016).

The effects of natural catastrophes and resilience differ between individuals and communities with gender emerging as a crucial distinguishing feature. The effect of flooding are not gender-neutral. As a result, various gender groupings interpret the impact of flood, cope with or adapt to its effects in different ways. Flood affects the entire community, but pre-existing climate of discrimination against women and gender role learning in Bihar has intersected with the calamitous consequences of flood leading to an increase in the impact and vulnerability on women in many ways (Madhuri, 2016). Perception of changing climate in general and flood in particular, is a complex process involving a variety of psychological constructs like knowledge, beliefs, attitudes, and worries about whether and how the climate is changing. Characteristics of an individual, experience, information received, and the cultural and geographical context in which they live all influence and shape perception (Whitmarsh & Capstick, 2018). Perception of risks associated with climate change drives the farmers in search for new knowledge and practices (Raghuvanshi & Ansari, 2020). Farmers' perception of climate change is vital for effectively implementing any policy/ strategies on climate change in actual field situation (Arunachalam et al., 2020). Likewise, analysis of gender perception of flood impacts is a prerequisite for assessing their adaptation

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decisions and for avoiding gender-blind rehabilitation policies. The fact that impact of natural disasters is gendered makes it crucial to understand how men and women perceive and interpret natural disasters so as to devise and advise on effective adaptation strategies that will assure their livelihoods.

## METHODOLOGY

The current research investigation was conducted in Bihar, a state which is home to 14 of India's 50 most vulnerable districts to climate change, accounting for 17.2 per cent of the country's flood-prone land. Out of 38 districts in Bihar, Darbangha was purposively selected as it tops the list of the districts which are most severely affected by flood (Flood Hazard Index, Bihar). Darbangha district has a total of 18 blocks, out of which two blocks each, one, which is highly prone to flood i.e. Hanumannagar and the other which is moderately prone to flood i.e. Baheri was selected. Two villages were chosen from each block, Godhaila and Uchauli from Hanumannagar and Jhakra and Aadabon from Baheri. So, a total of 4 villages were selected for the study. From each of the four villages, 30 respondents were selected (15 men and 15 women), thus making total sample size as 120.

Modified scale of Koshti et al., (2013) was used to measure the perceptions about flood impacts which referred to the opinion men and women farmers had towards the impact of flood. The scale incorporated sixteen statements. A five point continuum stretching from "strongly agree" to "strongly disagree" was used and a score was assigned as 5, 4, 3, 2, 1 for each statements. Modification has been done according to the study area. The scale consisted of 16 statements under three sub headings viz. Perception of Socio-economic impact of flood having 6 statements, Perception of Psychological impact of flood having 5 statements and Perception of Environmental impact of flood containing 5 statements. These statements were selected and finalized in consultation with scientists, experts and after reviewing existing literature on impacts of flooding. The sum of score of all items of the flood impact administered to the farmers was computed which indicated the perceived flood impact score for particular selected farmer. The maximum score was 80 while the minimum score was 16. The raw score such obtained was converted into perception index for the above 16 main indicators in aggregate form, with the help of following formula:

$$\text{Perception index} = \frac{\text{Obtained perceived flood impact score}}{\text{Obtainable perceived flood impact score}} \times 100$$

On the basis of CSRF method, men and women farmers were categorized on their perceived flood impact perception index. Perception of socio economic impact of flood for men was categorized as - low (up to 72.40), medium (72.41–92.93) and high (above 92.94). For women, low (up to 85.30), medium (85.31-99.93) and high (above 99.94). Likewise, perception of psychological impact of flood for men, low (up to 61.58), medium (61.59-88.95) and high (above 88.96). For women, low (up to 83.99), medium (84.00–99.60) and high (above 99.61). Lastly, perception of environmental impact of flood for men, low (up to 51.86), medium (51.87 to 84.80) and high (84.81). For women, low (up to 58.55), medium (58.56–84.11) and high (above 84.12).

A statistical tool of Karl Pearson's simple correlation coefficient (r) was followed to estimate the nature of relationship between the selected variable and the gender centric perception of flood impacts. Multiple regression was carried to determine the effect of independent variable on the dependent one.

## RESULTS AND DISCUSSION

### Perception of men and women farmers on flood impacts

This refers to the opinion men and women farmers had towards the impact of flood under subtopics – socioeconomic, psychological and environmental. The results regarding the perception of women farmers towards the impact of flood are given in Table 1.

**Table 1.** Distribution of respondents according to their perception of flood impacts

| Category | Women Percentage | Men Percentage |
|---|---|---|
| Perception of Socio economic impact of flood | | |
| Low | 8.34 | 18.33 |
| Medium | 58.33 | 60.00 |
| High | 33.33 | 21.67 |
| Perception of Psychological impact of flood | | |
| Low | 11.67 | 10.00 |
| Medium | 68.33 | 73.33 |
| High | 20.00 | 16.67 |
| Perception of Environmental impact of flood | | |
| Low | 15.00 | 3.33 |
| Medium | 73.33 | 76.67 |
| High | 11.67 | 20.00 |

Table 1 elucidates that maximum women (58.33%) and men farmers (60%) had medium perception of socio economic impact of flood. Further, 33.33 per cent of women and 21.67 per cent of men fell into the category of respondents who had high level of perception of socio economic impact of flood whereas 8.34 and 18.33 per cent of women and men fell into the low category for the same. With regard to perception of psychological impact of flood, majority 68.33 per cent women and 73.33 per cent men respondents had medium level of perception, 20 per cent women and 16.67 per cent men participants had higher level of perception succeeded by 11.67 per cent women and 10 per cent men who fell into the category of respondents having low level of perception. Further, 73.33 per cent of women and 76.67 per cent men had medium level of perception of environmental impact of flood, 11.67 per cent women and 20 per cent men were reported to have high level of perception for the same and 15 per cent women and 3.33 per cent of men farmers had lower level of perception.

### Relationship between profile characteristics and perception about flood impacts

Table 2 shows that age was positively and significantly related (at 5% level of significance) with perception of psychological and environmental impact of flood. This could be attributed to the fact that more the age, more is the probability of having experienced serious floods therefore more likely to take on family safety

**Table 2.** Relationship between women's profile characteristics and their perceptions about flood impacts

| S.No. | Variable | Karl Pearson's value "r" | | |
|---|---|---|---|---|
| | | Perception of socio economic impact of flood | Perception of psychological impact of flood | Perception of environmental impact of flood |
| 1. | Age | .204 | .297* | .303* |
| 2. | Family size | -.126 | .121 | .002 |
| 3. | Household headship | .331* | .473* | -.233 |
| 4. | Social participation | .131 | .324* | -.037 |
| 5. | Scientific orientation | .191 | .103 | .005 |
| 6. | Annual income | .102 | -.168 | -.128 |
| 7. | Extension contact | .054 | -.064 | -.125 |
| 8. | Risk orientation | -.011 | -.067 | -.235 |
| 9. | Social cohesiveness | -.284* | -.260* | -.026 |
| 10. | Awareness on flood | .025 | -.074 | .094 |
| 11. | Decision making | .088 | .275* | .041 |

*Significant at 5 % level of significance

responsibilities. This also implies that younger respondents may not have faced flood events in the past and thus lacked the necessary skills and knowledge to help shield themselves and other family members from flooding. Similarly, older people may have a more profound comprehension of how to deal with various types of danger, which could illustrate their concern about flooding, leading to age having a significant and a positive relation with their perception. The findings of this study is in line with Shah et al., (2022). With regard to perception of socio economic impact of flood, age had a positive but statistically non-significant relation.

Household headship had a positively significant relationship (at 5% level of significance) with perception of socio economic and psychological impact of flood. This may be assigned to the fact that women belonged to socio economically disadvantaged group opposed to men and were more vulnerable when confronted with floods, causing women to be more inclined to seek flood information and pay closer attention to property losses. The findings of this study is in line with Wang et al., (2018) & Linden (2014). With respect to perception of environmental impact of flood, household headship was seen to have a negative and a statistically non-significant relation. Social participation had a positively significant relationship (at 5% level of significance) regarding perception of psychological impact of flood. Women owing to their multiple responsibility get involved in productive areas and organizations like Jeevika's and SHG's. More the participation, more is the perception. This maybe explained in a way that more socially active women exercise several dynamics to flood impacts. Likewise social participation showed positive but statistically non- significant relation with respect to perception of socio economic impact of flood and a non-significant negative relationship with perception of environmental impact of flood. Social cohesiveness had a negatively significant relationship (at 5% level of significance) with the perception of socio economic and psychological impact of flood. The negative coefficients of social cohesiveness among women respondents may be because women were landless, possessing insufficient assets, limited access to credit or financial support had a reduced strength of relationship and diminished sense of solidarity among members of a community. As regards to perception of environmental impact of flood, it had a non-significant negative correlation. Decision making had a positive and a significant relationship (at 5% level of significance) with perception of psychological impact of flood. With regard to perception of socio economic and environmental impact of flood, decision making had a positive but statistically non-significant relationship.

**Relational analysis**

Table 3 indicates that age had a negatively significant relationship (at 5% level of significance) with perception of psychological impact of flood. This may be explained as men respondents in the study area were relatively strong mentally as compared to women. They attributed this behavior to having experienced and grown accustomed to flooding events and its impact to the extent that they feel little pressure mentally. They have learnt to live with it. Age had a negative correlation with perception of socio economic impact of flood whereas it was positively related with perception of environmental impact of flood. Education of the men respondents had a positive and a significant relationship (at 5% level of significance) with perception of psychological and environmental (at 1% level of significance) impact of flood. This implies that farmers with higher educational attainment were more likely to perceive flood impact than less-educated or illiterate farmers. Educated farmers clearly have more knowledge, the capacity to comprehend and adapt to expected changes, the capacity to anticipate future scenarios, and more access to information and opportunities than others. The findings are in line with Türkkan & Hrca (2021); (Bharat et al., 2022). With regard to perception of socio economic impact of flood, education had a positive but a non- significant relationship. Family size had a positive and a significant relationship (at 1% level of significance) with perception of psychological impact of flood. This may be because larger family size usually have more interaction, sharing among themselves thus leading to a better perception of psychological impact of flood by all of the members. The findings differ with Uddin et al., (2017) who reported that family size had a negative and a significant relationship with farmer's perception of climate change. With perception of socio economic and environmental impact of flood, family size had a positive but a non-significant relationship. Scientific orientation had a negative and a significant relationship (at 5% level of significance) with

**Table 3.** Relationship between men's independent variables and their perceptions about flood impacts

| S.No. | Independent variable | Karl Pearson's value "r" | | |
|---|---|---|---|---|
| | | Perception of socio economic impact of flood | Perception of psychological impact of flood | Perception of environmental impact of flood |
| 1. | Age | -.100 | -.268* | .106 |
| 2. | Education | .064 | .298* | .525** |
| 3. | Family size | .230 | .437** | .229 |
| 4. | Social participation | -.104 | -.123 | .048 |
| 5. | Scientific orientation | -.081 | -.273 | -.256* |
| 6. | Annual income | -.263* | -.184 | .293* |
| 7. | Extension contact | -.255* | -.255* | -.087 |
| 8. | Risk orientation | -.051 | -.061 | .088 |
| 9. | Social cohesiveness | -.127 | -.027 | -.111 |
| 10. | Awareness on flood | -.065 | -.001 | -.248 |

*Significant at 5 % level of significance and **Significant at 1 % level of significance

perception of environmental impact of flood. It was also found to have a negative correlation with perception of socio economic and psychological impact of flood but it was statistically not significant. Annual income had a negatively significant relationship (at 5% level of significance) with perception of socio economic impact of flood. This implies that poorer households might have a greater perception as compared to well to do households. This may be attributed to the reason that most of the poorer households belonged from extremely flood prone areas that relied more on agriculture as their primary source of income. They experienced damages incurred by flood to a greater extent and since experience is one of the factors that influences perception, respondents from lower income group perceived the socio economic impact of flood in better way. The findings are in line with Liu et al., (2022). However, with regards to perception of environmental impact of flood, it had a positive and a significant relationship (at 5% level of significance). As revealed from the Table 3 annual income had a negative and a statistically non-significant relationship with perception of psychological impact of flood. Perception of socio economic and psychological impact of flood had a negatively significant relationship (at 5% level of significance) regarding extension contact. This may be because personal experience with disaster events weighs more in any perception studies. In addition to that, it is also to be noted that low level of extension intervention was seen in the surveyed villages. Extension contact had a negatively but statistically non-significant relationship with perception of environmental impact of flood.

**Impact of independent variables on dependent variable**

Table 4 elucidates that 38, 54.30 and 37.60 per cent variance on women farmer's perception of socio-economic, psychological and environmental impact of flood were as a result of explained factors that were included under the present study. Education was found to be significant at 10% level of significance with respect to perception of socio economic impact of flood. As regards to perception of psychological impact of flood, education, household headship and scientific orientation was found to be significant at 5% level of significance whereas annual income was significant at 10% level of significance. In case of perception of environmental impact of flood, age was significant at 5% level of significance followed by risk orientation significant at 0.05 level of probability and annual income had a significant relationship at 0.01 level of probability.

**Table 4.** Impact of independent variables of women on dependent variable

| Factors | Perception of socio economic impact of flood | | | Perception of psychological impact of flood | | | Perception of environmental impact of flood | | |
|---|---|---|---|---|---|---|---|---|---|
| | b value | t value | significance | b value | t value | significance | b value | t value | significance |
| Age | .058 | .403 | .689 | .160 | 1.420 | .162 | .342 | 2.412 | .020** |
| Education | -.273 | -1.791 | .080*** | -.315 | -2.628 | .012** | .057 | .379 | .707 |
| Family size | -.118 | -.886 | .380 | .174 | 1.669 | .102 | -.101 | -.770 | .445 |
| Household headship | .179 | 1.042 | .303 | .330 | 2.452 | .018** | -.256 | .1.51 | .138 |
| Social participation | .018 | .119 | .905 | .225 | 2.132 | .038** | .084 | .560 | .578 |
| Scientific orientation | .088 | .632 | .530 | -.071 | -.645 | .522 | .012 | .088 | .930 |
| Annual income | .119 | .848 | .401 | -.212 | -1.932 | .061*** | -.203 | -1.46 | .151 |
| Extension contact | -.007 | -.049 | .961 | -.177 | -1.477 | .146 | -.094 | -.621 | .537 |
| Risk orientation | .023 | .158 | .875 | -.027 | -.236 | .841 | -.269 | -1.83 | .073*** |
| Social cohesiveness | -.221 | -1.449 | .154 | -.080 | -.664 | .510 | .024 | .161 | .873 |
| Awareness on flood | .063 | .427 | .672 | -.630 | -.551 | .584 | .160 | 1.103 | .276 |
| Decision making | -.039 | -.947 | .349 | .028 | .241 | .810 | .110 | .755 | .454 |
| | $R^2$ = .380 | | | $R^2$ = .543 | | | $R^2$ = .376 | | |

*significant at 1% level; * *significant at 5% level; ***significant at 10% level

**Table 5.** Impact of independent variables of men on dependent variable

| Factors | Perception of socio economic impact of flood | | | Perception of psychological impact of flood | | | Perception of environmental impact of flood | | |
|---|---|---|---|---|---|---|---|---|---|
| | b value | t value | significance | b value | t value | significance | b value | t value | significance |
| Age | -.238 | -1.675 | .100 | -.344 | -2.579 | .013** | .089 | .614 | .524 |
| Education | -.032 | -.230 | .819 | .105 | .807 | .424 | -.130 | -.918 | .363 |
| Family Size | .053 | .422 | .675 | .408 | 3.448 | .001* | .253 | 1.959 | .056*** |
| Social Participation | .086 | .597 | .554 | .048 | .357 | .732 | -.003 | -.018 | .986 |
| Scientific Orientation | -.053 | -.386 | .715 | -.092 | -.678 | .501 | -.377 | -2.554 | .014** |
| Annual Income | -.251 | -2.053 | .046** | -.132 | -1.156 | .253 | .336 | 2.688 | .010* |
| Extension contact | -.247 | -1.597 | .117 | .010 | .068 | .946 | -.042 | -265 | .792 |
| Risk Orientation | -406 | -2.66 | .010* | -.300 | -2.104 | .041** | .123 | .788 | .435 |
| Social Cohesiveness | .181 | 1.314 | .195 | .091 | .707 | .483 | -.147 | -1.040 | .303 |
| Awareness on flood | -.501 | -3.063 | .004* | -.281 | -1.834 | .073*** | -.004 | -.023 | .982 |
| Decision making | -.130 | -1.014 | .316 | .038 | .321 | .749 | .117 | .896 | .375 |
| | $R^2$ = .352 | | | $R^2$ = .433 | | | $R^2$ = .321 | | |

*significant at 1% level; * *significant at 5% level; ***significant at 10% level

Table 5 indicates that 35.20, 43.30 and 32.10 per cent variance on men farmers' perception of socio-economic, psychological and environmental impact of flood were as a result of explained factors that were included under the present study. Annual income was found to be significant at 5% level of significance followed by risk orientation and awareness on flood which were significant at 0.01% level of significance in case of perception of socio economic impact of flood. As regards to perception of psychological impact of flood, family size showed a significant relationship at 0.01 level of probability followed by risk orientation and age which were significant at 5% level of probability. Awareness on flood was found to be significant at 10% level of significance. With respect to perception of environmental impact of flood, family size was significant at 10% level of significance followed by scientific orientation significant at 0.05 level of probability and annual income had a significant relationship at 0.01 level of probability.

## CONCLUSION

Floods are one of nature's most destructive acts, affecting human life in a variety of ways. It is among the most common causes of social unrest since it can directly impact the socioeconomic state of local populations. This study was conducted to assess and examine the gender based variations in perception of socio economic impact of flood. From the findings it can be inferred that maximum of the women and men farmers showed medium level perception with women having slightly higher perception as compared to their male counterparts. A very few or negligible interference of government organizations in farming activities in the areas has aggravated risk perception. So appropriate measures need to be taken. Government should take initiative to focus on livelihood diversification activities like alternating crop, flood resilient livestock breed, floating parks. It is also recommended to launch sustainable knowledge empowerment programmes so as the risked community could upgrade the social views on gender discrimination.

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