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Original Article

Monsoon and Mandays: The Impact of a Meteorological Parameter on a Socio-Economic Paradigm

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Abstract

Agricultural production and productivity is largely dependent on the number of mandays in a particular cropping season. The monsoon rain deviation hampers the normal agricultural works by reducing the usual man days. The present study is conducted in Ghoragachha village under Saguna gram panchayet, Nadia, West Bengal. The number of respondents were 60 and they were selected randomly.The data were collected trough pilot survey, structured interview and focused group interview.The statistical tools used for data analysis are correlation coefficient, step down regression, path analysis and factor analysis. Cropping intensity(X_8), yield of rice(X_{11}), yield of pulses(X_{12}) are some of the variables those have created a significant impact on the number of man days.The variables which were retained after step down regression are family size(X_3), homestead land(X_5), yield of pulses(X_{12}) that means these are the most important causal variables which affect the consequent variable.

Keywords: Monsoon; Man Days; Cropping Intensity; Yield; Size of Holding; Family Size.

Introduction

Monsoon rain deviation, though a meteorological parameter but it also has a swashbuckling impact on many socio-economical, socio-psychological and techno-managerial aspects. According to Dewi, PP(2009) Global warming mostly causes climate change which affects agriculture by increasing the temperature, modifying the rate of rainfall, water-preservation and soil fertility. Climate change impact on agriculture is different depending on the agro-ecosystem condition, but based on a number of studies, the most affected part of the world would seem to be the tropical region. Ponton, -C; Giosan, -L; Eglinton, -T-I; Fuller, -D-Q; Johnson, -J-E; Pushpendra-Kumar; Collett, -T-S (2012) has suggested that Spanning a latitudinal range typical for deserts, the Indian peninsula is fertile instead and sustains over a billion people through monsoonal rains. Despite the strong link between climate and society, our knowledge of the long-term monsoon variability is incomplete over the Indian subcontinent. Not only the desert region, plains and plateaus also are affected socially by deviated monsoon rain. This social phenomenon includes man days, income, livelihood, rituals, cultural festivals etc.The first monsoon of the season if doesn't wet the whole canopy, it considered a bad season for crop production. Monsoon rain can affect the production and productivity by hampering the effective working days. If a farmer can't go to field to

attend his daily farm works, it would surely have a devastating impact on the over all production. The present study is about effect of deviating monsoon on the number of farm man days.

Objectives

The present research has got the following objectives for proper justification of the topic and for bringing out the expected outcome-

- Identification of factors and their interaction with monsoon rainfall in terms of sociological components and functions.
- Generation of participatory data as to estimate the nature and impact of monsoon rainfall on the socio-cultural, agro-economic and techno managerial aspects.
- To generate micro level policies based on the empirical data in order to delineate the possible interventions to deal with the sociology of monsoon.

Research Setting

The area of investigation of this study is situated in the state of West Bengal located in the eastern part of India. The state of West Bengal in eastern India has a unique social and ecological background which influence the living standard and behavioral patterns of the people in many ways. The area of investigation belong to the Haringhata block in Nadia district. The area of the study in village Ghoragachha under Rautari gram panchayat.

Research Methodology

State, district, sub division, block, panchayet and village is selected through purposive sampling. Sixty respondents are selected through random sampling. Here, in this study we have considered fifteen independent variables against one dependent variable that is monsoon and man days (Y1).

These Selected Independent Variables are as follows-

Sl. No.	Variables	Notation
1	Age	X_1
2	Education	X_2
3	Family size	X_3
4	Size of holding	X_4
5	Homestead land	X_5
6	Family income(farm)	X_6
7	Family income(off farm)	X_7
8	Cropping Intensity	X_8
9	Crop mix	X_9
10	Livestock	X_{10}
11	Yield of Rice	X_{11}
12	Yield of Pulses	X_{12}
13	Yield of vegetables	X_{13}
14	Exposure to media	X_{14}
15	Disease pest incidence	X_{15}

First of all 5% of the total sample (i.e 3) has selected randomly for pilot study. These respondents are eventually discarded from main sample to reduce the sampling error.

Then the rest respondents are interviewed with the help of an interview schedule listed with some specific and relevant questions. This interview has done with rapt attention and care so that putting word in mouth effect, any personal or communal biasness couldn't take place.

Result and Discussion

The qualitative data is quantified using specific numerical procedure. Then the quantified data were put under five statistical analysis that are- co-efficient of co-variance, step down regression, canonical co-variate analysis, path analysis and factor analysis.

The findings and their revelations are discussed here under-

Coefficient of Correlation Tables

Table 1: Coefficient of Correlation (r): Mandays and monsoon (Y) vs. 15 independent variables(x_1-x_{15})

Sl. No.	Variables	r value	Remarks
1	Age(x1)	-0.018	-
2	Education(x2)	0.223	-
3	Family size(x3)	-0.146	-
4	Size of holding(x4)	-0.166	-
5	Homestead land(x5)	0.032	-
6	Family income(farm)(x6)	-0.158	-
7	Family income(off farm)(x7)	0.032	-
8	Cropping Intensity(x8)	-0.264	*
9	Crop mix(x9)	-0.061	-
10	Livestock(x10)	-0.019	-
11	Yield of Rice(x11)	0.275	*
12	Yield of Pulses(x12)	0.327	**
13	Yield of vegetables(x13)	0.198	-
14	Exposure to media(x14)	0.197	-
15	Disease pest incidence(x15)	0.192	-

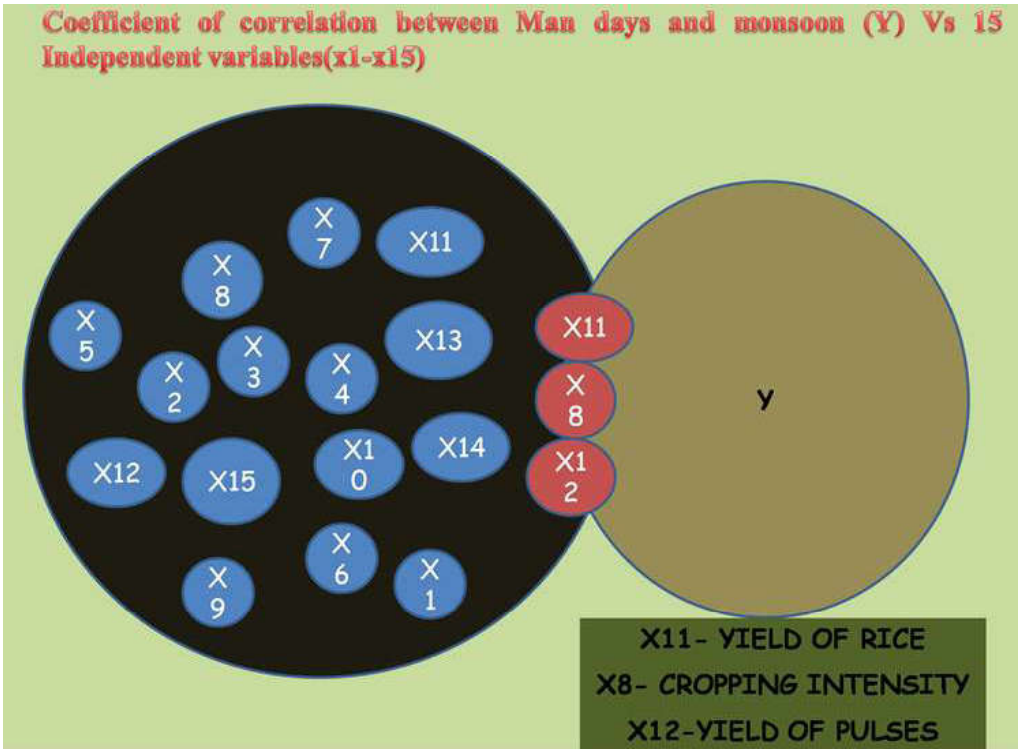
Result

Table i presents the coefficient of correlation between Y(mandays and monsoon) and 15 independent variables. It has been found that following variables viz. Copping intensity (x8), yield of rice (x10) and yield of pulses (x11) have recorded significant correlation with the dependent variable.

Revelation

The variables are basically agro economic by nature and they have shown that the cropping intensity or yield of crops are significantly influencing the perception on mandays affected due to monsoon. The monsoon behavior is closely related to crop husbandry and management , which also generate mandays and creates livelihood therefrom.

Fig. 1:



Step down Regression Analysis

Result

Table ii presents the multiple regression analysis between criterion variable man days and monsoon vs. 15 causal variables. It has been found that the variable education (x2), family size (x3) and yield of pulses (x12) have contributed substantially to the variance embedded with the consequent variable y1.due to delayed monsoon and at the same time, an increase in post monsoon rainfall the yield of pulses have to suffer. The R^2 value being 0.3677, it is to infer that 36.67 per cent of variance in the consequent variable has been explained by the combination of these 15 causal variables.

Table iii presents the step wise regression and it has been depicted that the 3 causal variables that are family size (x3), homestead land (x5), yield of pulses (x12) have been retained at the last step.

Table 2: Step down Regression Analysis, Man days and monsoon (Y) VS 15 Causal variables (x_1-x_{15})

Sl. No.	Variables	Beta	Beta x R	Reg. coef. B	S.E. of B	t value
1	Age(x1)	0.142	-0.697	0.004	0.004	0.911
2	Education(x2)	1.348	81.916	0.119	0.069	1.708
3	Family size(x3)	0.745	-29.740	0.143	0.070	2.039
4	Size of holding(x4)	0.521	-23.573	0.528	0.499	1.059
5	Homestead land(x5)	-0.820	-7.148	-2.360	1.829	1.290
6	Family income(farm)(x6)	-0.110	4.713	0.000	0.000	0.701
7	Family income(off farm)(x7)	-0.113	-1.011	0.000	0.000	0.814
8	Cropping Intensity(x8)	-0.123	9.172	-0.001	0.001	0.807
9	Crop mix(x9)	-0.033	0.559	-0.001	0.005	0.251
10	Livestock(x10)	0.062	-0.333	0.027	0.087	0.317
11	Yield of Rice(x11)	0.182	13.623	0.096	0.476	0.201
12	Yield of Pulses(x12)	1.228	109.227	26.913	15.795	1.704
13	Yield of vegetables(x13)	-0.012	-0.641	-0.001	0.008	0.077
14	Exposure to media(x14)	-7.095	-369.811	-1.455	3.086	0.471
15	Disease pest incidence(x15)	6.004	313.743	8.617	21.281	0.405

Multiple R-SQ=36.77%
S.E=0.80

Table 3: Regression Analysis, Man days and monsoon (Y) VS 15 Causal variables ($x_{3,}x_{5,}x_{12}$)

Variables	Beta	Beta x R	Reg. coef. B	Coef of B	S.E. of B	t value
Family size(x3)	0.585	-32.769	-0.287	0.112	0.048	2.365
Homestead land(x5)	-0.359	-4.388	0.063	-1.032	0.474	2.180
Yield of Pulses(x12)	1.099	137.167	0.639	24.089	5.733	4.201

R-SQ =26.21%
S.E=0.41

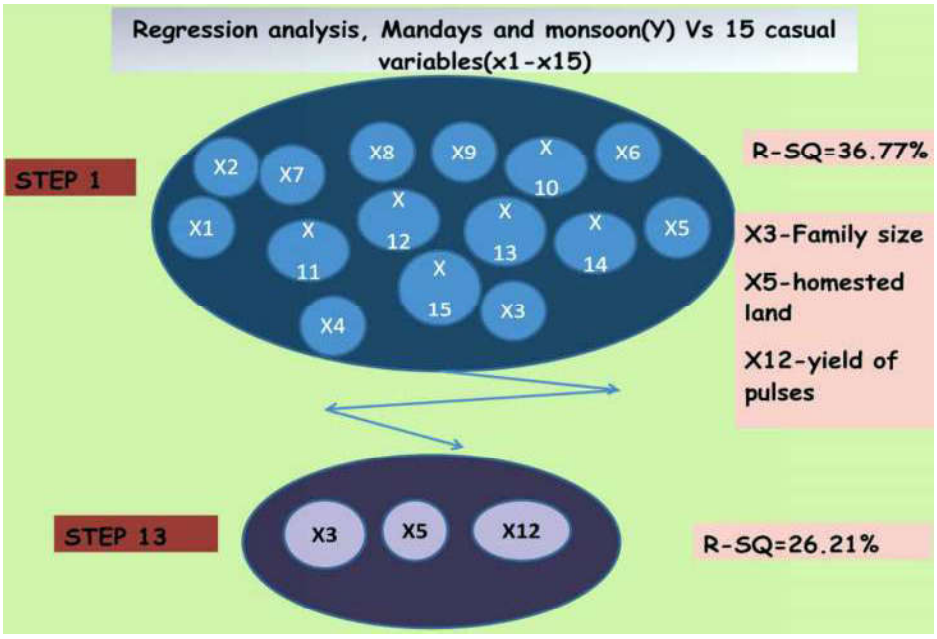


Fig. 2: Factor Analysis

Table 4: Factor Analysis: Conglomeration of 15 explanatory variables into 5 factors

Factors	Variables	Factor Loading	% of Variance	Cumulative %	Factor Renamed
Factor 1	Family size(x_3)	-.899	29.495	29.495	Family resource
	Homestead land(x5)	.844			
	Livestock(x10)	.552			
	Yield of Rice(x11)	.924			
	Yield of Pulses(x12)	.900			
Factor 2	Age(x1)	-.620	23.918	53.413	Perception proficiency
	Education(x2)	.927			
	Exposure to media(x14)	.927			
	Perception on Disease pest incidence(x15)	.927			
Factor 3	Size of holding(x4)	.639	12.301	65.714	Farm resource
	Cropping Intensity(x8)	.752			
Factor 4	Family income(farm)(x6)	.580	9.157	74.871	Family enterprise
	Yield of vegetables(x13)	-.670			
Factor 5	Family income(off farm)(x7)	.584	7.164	82.035	Agro ecological proficiency
	Crop mix(x9)	.734			

Table iv presents the factor analysis, wherein 15 numbers of independent variables have been conglomerated into 5 dominant factors

Table 4 presents the factor analysis, wherein 15 numbers of independent variables have been conglomerated into 5 dominant factors.

Factor 1 is consists of 5 variables viz. Family size (x3), education (x2), homestead land (x5), livestock (x10), yield of rice (x11) and yield of pulses (x12). These variables contribute about 29.49 per cent of variance, and the factor renamed as family resource.

Factor 2 consists of 4 variables viz.age(x1), education(x2), exposure to media(x14) and perception on disease pest incidence(x15). These variables contribute about 23.91 per cent of variance and is renamed as perception proficiency.

Factor3 consists of 2 variables those are size of holding (x4) and cropping intensity (x8). Which contributes about 65.71 per cent of variance and is renamed as farm resources.

Factor 4 consists of 2 variables viz. Farm family income (x6) and yield of vegetables(x13). These 2 variables contribute 74.87 per cent variance and is renamed as family enterprise.

Factor 5 consists of 2 variables viz. Farm income (x7) and crop mix (x9). These 2 variables contribute 82.03 per cent of variance and is renamed as agro ecological proficiency.

The R^2 value being 0.2621, it is to infer that 26.21% of variants in the consequent variable has been explained by the combination of these 3 causal variables.

Revelation

The perceived loss of mandays due to delayed monsoon has well been predicted by 3 functional variables viz. family size (x3), homestead land (x5), yield of pulses (x12) to imply that those having more lands under crop especially that of pulses and higher homestead land with a possibility of vegetable enterprises have become more adept to perceive the negative impact of delayed monsoon.

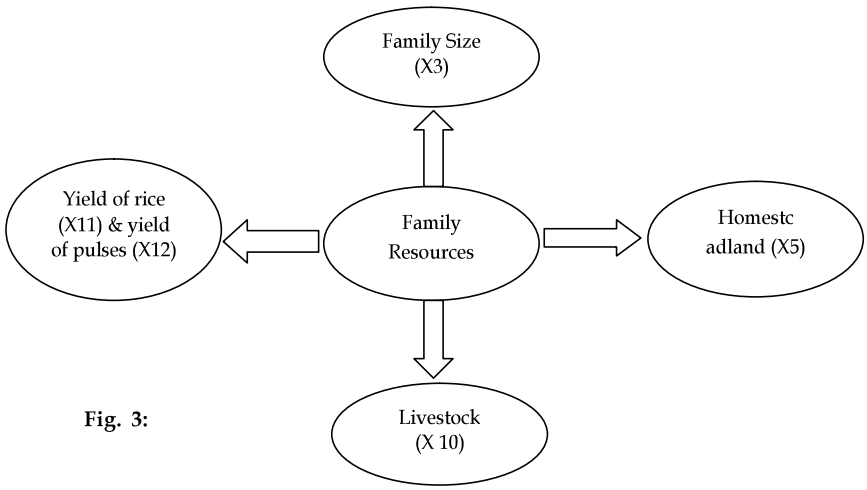


Fig. 3:

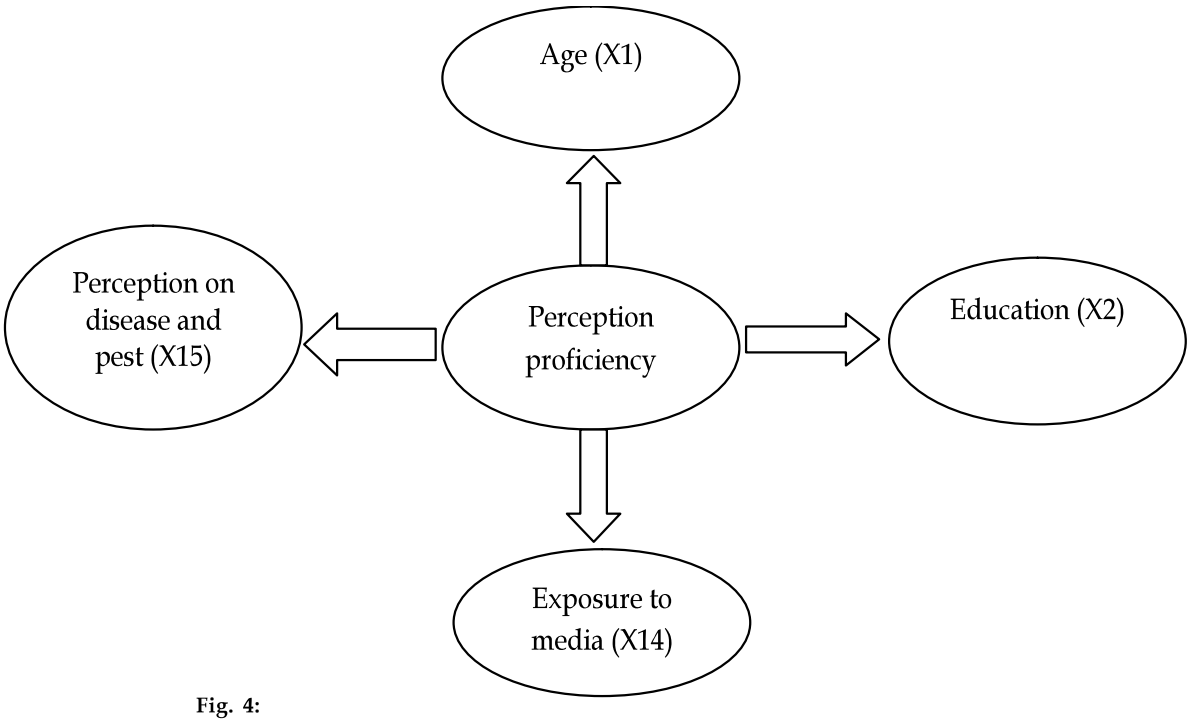
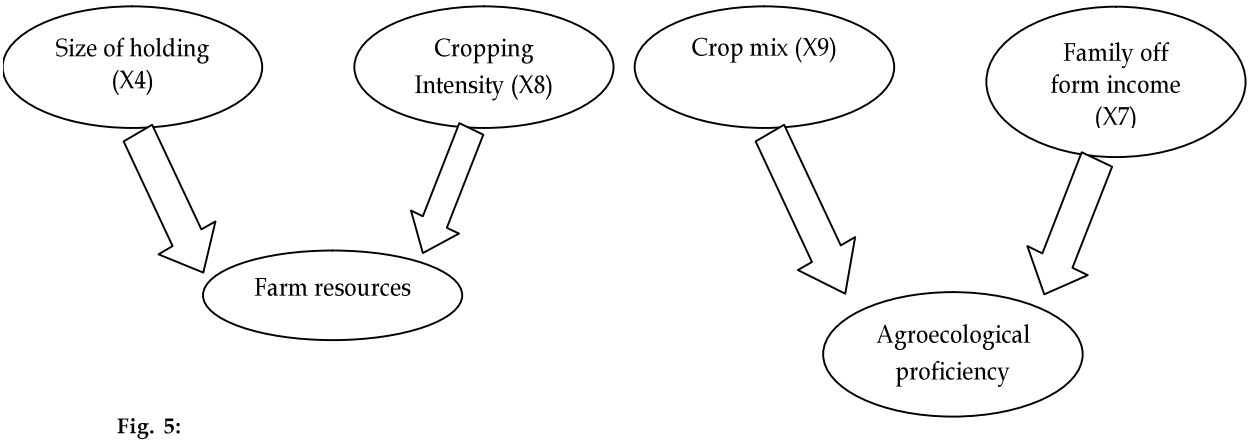


Fig. 4:



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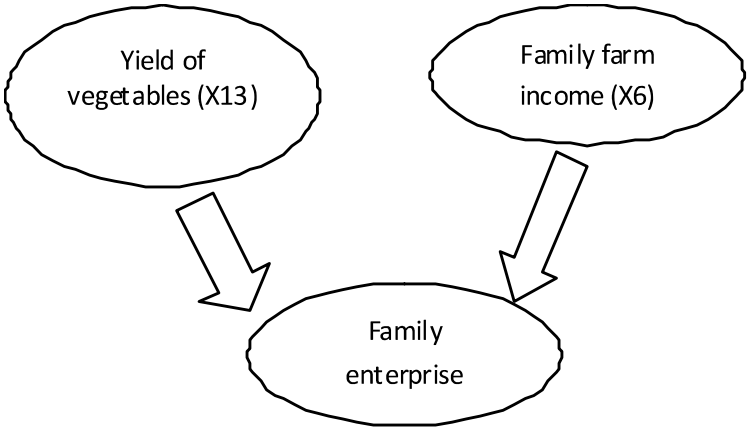

Fig. 6:

Table 6: Path analysis: Decomposition of total effect (r) into Direct, Indirect and Residual effect [man days and Monsoon VS 15 consequent variables (x1-x15)]

Sl. No.	variables	Total effect	Direct Effect	Indirect Effect	Highest indirect Effect
1	Age(x1)	-0.018	0.142	-0.16	x14(4.204)
2	Education(x2)	0.223	1.348	-1.125	x14(-6.9899)
3	Family size(x3)	-0.146	0.7446	-0.8906	X14(1.2154)
4	Size of holding(x4)	-0.166	0.520	-0.686	X5 (-0.6903)
5	Homestead land(x5)	0.032	-0.819	0.851	X12(0.873)
6	Family income(farm)(x6)	-0.158	-0.109	-0.049	X14(0.8716)
7	Family income(off farm)(x7)	0.032	-0.113	0.145	X7(0.7217)
8	Cropping Intensity(x8)	-0.264	-0.127	-0.137	X14(0.7288)
9	Crop mix(x9)	-0.061	-0.033	-0.028	X14(-0.7317)
10	Livestock(x10)	-0.019	0.062	-0.081	X14(1.3709)
11	Yield of Rice(x11)	0.275	0.181	0.094	X12(1.2047)
12	Yield of Pulses(x12)	0.327	1.228	-0.901	X14(-0.7698)
13	Yield of vegetables(x13)	0.198	-0.011	0.209	X14(-1.0644)
14	Exposure to media(x14)	0.197	-7.094	7.291	X15(6.0039)
15	Disease pest incidence(x15)	0.192	6.004	-5.812	X14(-7.0945)

Residual= 63.23%

The variable exposure to media (x14) has enrooted the highest indirect effect (for 10 times) on the consequent variable. Table 21 presents the path analysis to decompose the TE into direct, indirect and residual effect. It has been found that the variable education (0.223) has highest direct effect , while the variable exposure to media has exerted the highest indirect effect (7.291) on the perception of mandays and monsoon. Education as being the pursuits of cognitive construction, it has rightly contributed to the perception of loss of mandays due to climate change. Similarly exposure to media has contributed highest associative impact for this consequent variable.

The residual effect being 63.23 per cent, it is to infer that even with the combination of these 15 exogenous variables, 63.23 per cent of variance cannot be explained.This suggests the inclusion of more numbers of relevant and consistent variables for this framework of study.

So, the predominated factors, as formed by interactionally accommodating them based on factor loading, can offer a strategic implication by effectively downsizing the sphare of variables into well textured factors.

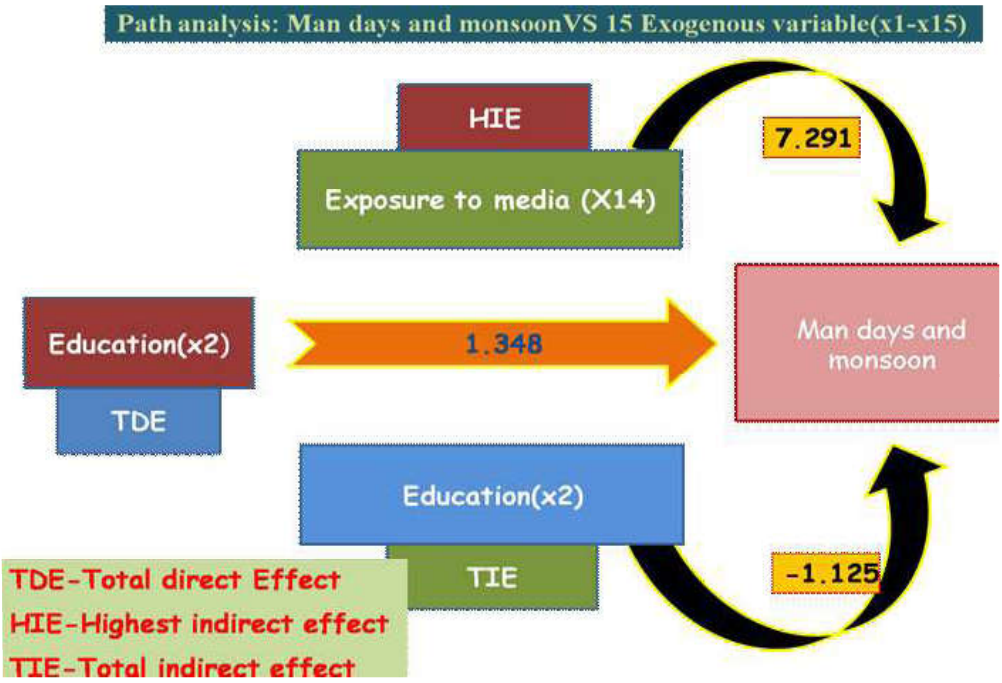

Fig. 7:

Conclusion

As a paper of Revadekar,-J-V; Preethi,-B (2012) suggestes that the Indian economy largely depends on agriculture which is highly influenced by the spatio-temporal variability of precipitation. Kharif and rabiare the two main crop-growing seasons which require major proportion of rainfall. Increase in heavy precipitation events, however, can have adverse effects on the crops. Heavy precipitation hampers normal agricultural works because if the field is full of puddles and mad with a continuous rainfall, then it's really difficult to continue with the daily farming works like weedind, fertigation, manuring, thinning etc. This ultimately leads to lesser croppingintensity,lesser yield and ultimately the overall crop production would be lessen. Off season rain may increase the chances of several diseases, so, if a farm family size is big then there would be options, but in small families where only 1-2 adult workers are present, then it would be really difficult for them to carry on with the farming works. At another size, if the size of holding is big means the farm resources are large then they can opt for higher labours in absence of family labour and also can have an income from other souces(like-goattery, fishery, poultry etc.) if the main crop fails. Vegetable enterprises can be a remunerative option in this circumstances as the vegetable gardens don not need much physical labour once they are established properly.

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