SOCIETY OF EXTENSION EDUCATION

RESEARCH ARTICLE

Livelihood Security and its Determinants Among Farmers During COVID-19 Pandemic in Telangana, India

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ABSTRACT

With COVID-19 outbreak globally several studies on livelihoods and food systems are conducted in consistent manner. India being an agrarian economy, the impact of pandemic on agricultural sector and farmers needs a great focus. The present exploratory study on Livelihood Security (LS) was carried out in Telangana, India among Suryapet and Rangareddy districts purposively with 160 respondents selected through multistage random sampling during 2021. Livelihood Security Index was used with 7 sub-indicators and it depicted that only one sub-indicator i.e., economic security contributing less than 50% to LS and majority of the respondents have moderate level of livelihood security (42.5%) with overall mean value of 0.628. The determinants of LS were identified through Multivariate regression analysis model and found 14 predictors were fitted in model responsible for 62.8% variance in the dependent variable (LS). The regression model revealed that Family size, educational years, Livestock holding, Social Participation, annual family income, mass media exposure, and Risk orientation were most aided predictor variables in the improvement of livelihood security during COVID-19 with educational years having greater β-value. R² standardized linear graph was plotted against the LS and the significant predictor value demonstrating the distribution of respondents over graph according to their livelihood security with R² linear value 0.606. Thus, during COVID-19 more livelihood options for diversification of income can aid in increase of LS. The present study concluded by suggesting policy implications to ensure livelihood security among farming communities during pandemic.

Key words*: COVID-19; Livelihood security; Predictor variables; Regression analysis; Exploratory study.*

World Health Organization (WHO) declared the global outbreak, COVID-19 as Public Health Emergency of International Concern on 30 January, 2020 and a pandemic on 11 March, 2020. As of December, 2022 there were 651,918,402 confirmed cases and 6,656,601 people lost their lives to COVID-19 globally with millions suffering from long-term and debilitating health consequences. Pandemic has disruptions in every aspect with major focus on health, food security and livelihoods of people. The disruption in economic activities resulted in contracted global economy by 3.3per cent in 2020 and global growth by 2.8 per cent in 2022 and forecasted to 2.7 per cent in 2023. This is the weakest growth profile since 2001 except for the global financial crisis and the acute phase of the COVID-19 pandemic reflecting

significant drop down of largest economies (*IMF, 2022*). During 2020 the pandemic pushed 97 million people into poverty (*Gerszon Mahler et al., 2021*) affecting the livelihoods of millions globally.

India with more than 200 million people living in extreme poverty was badly hit by the pandemic and severely exposed to food insecurities (*Menon and Schmidt-Vogt, 2022*). India reported its first COVID-19 case on 27th January, 2020. As of December, 2022 India became a hotspot with 44,676,678 confirmed cases with 530,690 deaths reported (*WHO, 2022*). India being an agrarian economy with majority of its population living in rural communities it is essential to study the impact of COVID-19 on rural livelihoods. The pandemic, which coincided with the onset of the Rabi harvest seasons added more vulnerability of agricultural sector

in the country. Agriculture sector have shown 2.5 per cent decrease in the GDP growth during Fiscal Year 2020-21 (Quarter 1: April to June) due to impact of COVID-19 (*Cariappa et al., 2021*). India is self-sufficient with food grain stock that covers 2.347 times moon distance when bag of grains staked one over another (*Lal et al., 2022*) and capable of feeding 80.61 crore of people in the nation during COVID-19 pandemic times (*NFSA, 2020*). But food security alone is not enough to determine the livelihood security of an individual; it also includes other components such as educational, health, infrastructure, economy, institutional and social securities. So, the present study was conducted keeping in view that how COVID-19 impacted the farming rural communities and their livelihoods in India with emphasis on Telangana state. The main objective of the study is to analyse how farmers faced the uncertainties like pandemic in the context of COVID-19. The manuscript studied the following components

- Assessment of Livelihood security among farming community and
- Determinants of Livelihood security Index during COVID-19.

METHODOLOGY

The Exploratory research study was investigated in Telangana State of India during 2021. Seven districts were severely affected during COVID-19 outbreak, out of these, two districts with highest number of cases were purposively selected, viz., Rangareddy and Suryapet for research. Further selection of blocks, villages and farmers was done through multistage sampling technique. Two blocks from each district were selected randomly and using a simple random sampling procedure, two villages were chosen from each block. 20 respondents were selected by random sampling. Thus, this study was conducted with 160 respondents from 8 villages in 4 blocks of 2 districts.

To assess Livelihood security among rural communities, an Index developed by *Lal et al. (2017)* following *Alfares and Duffua (2009)* and *Sullivan et al. (2006),* FAO methodology for the construction of Index was administered. Livelihood Security Index

was established by taking different indicators into consideration and thus there are 7 sub-indicators of livelihood security with different weightages (Table 1). The weightages were obtained from ranks using Alfares methodology which was based on multi-criteria decision making with cardinal weights of ordinal ranking.

Table 1. List of Sub-indicators of Livelihood security Index and their weightages

Sub-indicators	Statements	Weightage
Food security (FS)	11	96.24
Economic security (ES)	11	80.94
Health security (HS)	11	82.02
Educational security (EDS)	13	77.99
Social security (SS)	10	65.91
Institutional security (IS)	10	57.59
Infrastructural security (INFS)	10	58.93

In the present study a range of 14 possible predictor variables are included that undermine as explanatory variables for criterion on Livelihood Security of the farmers and determine the relative and absolute influence of these predictor variables on the dependent variable, livelihood security of farmers. Before applying the regression model, the fitness of the model was checked through R^2 value. R^2 is known as the coefficient of determination shows how much variability in the dependent variable (Livelihood security) is explained by independent variables while regression coefficients (B-Unstandardized coefficient/ β-standardized coefficient) determines the rate of change in livelihood security by each independent variable. Unstandardized coefficient (B) is taken into consideration for comparing different independent variables only when they are on same scale or same units of measure. But standardized β coefficients are more appropriate to compare different variables that predict or determine the dependent variable at different units (Lal et al., 2016). It is also reasonable to assume that predictors with large standardized coefficients (β) are more important than other predictors with smaller coefficients. β value is also interpreted as the value of the difference in dependent variable corresponding with one unit difference in independent variable that also communicates the direction (positive or negative).

$$\text{Livelihood security index} = \frac{W_{fs}FS_J + W_{es}ES_J + W_{hs}HS_j + W_{eds}EDS_j + W_{ss}SS_j + W_{is}IS_j + W_{infs}INFS_j}{W_{fs} + W_{es} + W_{hs} + W_{eds} + W_{ss} + W_{is} + W_{infs}}$$

RESULTS AND DISCUSSION

Extent of livelihood security in the study area : "Livelihood Security" had been assessed by encompassing seven sub-indicators and all these seven securities works together to provide the respondent's total livelihood security. The findings across the different components are given here in Table 2.

Food security index: Lucid examination of Table 2 revealed that majority of respondents (85%) has high level of food security followed by low (6.87%) and medium (8.13%) levels. The total level of food security in the study area reported 80.8 per cent, the highest of seven indicators. The research area's highest food security was apparently due to the highest number of PDS beneficiaries (81.8 lakh) with Food Security

Table 2. Distribution of respondents based on different indicators of Livelihood Security Index (LS) (N=160)

Indicators/Categories	No. (%)	Index value
Food security (FS)		
Low (>0.65)	11(6.875)	0.808
Medium (0.65-0.71)	13(8.125)	(0.4-0.97)
High (>0.97)	136(85)	
Economic security (ES)		
Low (>0.34)	51(31.875)	0.404
Medium (0.34-0.50)	68(42.50)	(0.12-0.73)
High (>0.50)	41(25.625)	
Health security (HS)		
Low(>0.55)	21(13.125)	0.625
Medium(0.55-0.67)	89(55.625)	(0.27-0.91)
High(>0.67)	50(31.25)	
Educational security (EDS)		
Low(>0.40)	46(28.75)	0.506
Medium(0.40-0.62)	72(45)	(0.00-0.95)
High(>0.62)	42(26.25)	
Social security (SS)		
Low(>0.62)	52(32.5)	0.710
Medium(0.62-0.79)	58(36.25)	(0.31-1.00)
High(>0.79)	50(31.25)	
Institutional security (IS)		
Low(>0.50)	28(17.5)	0.614
Medium(0.50-0.71)	95(59.375)	(0.1-1.00)
High(>0.71)	37(23.125)	
Infrastructural security (IFS)		
Low(>0.66)	26(16.25)	0.729
Medium(0.66-0.81)	123(76.875)	(0.3-0.9)
High(>0.81)	11(6.875)	
Overall livelihood security (LS)		
Low(>0.59)	43(26.875)	0.628
Medium(0.59-0.68)	68(42.50)	(0.414-0.814)
High(>0.68)	49(30.625)	

cards. During lockdown period of April, 2020 to June, 2020, Govt.of Telangana distributed 12kgs of rice and one kg of red gram per person for 3 months which made the farmers of the area to have high level of food security.

Economic security index: The findings in the Table 2 shows that the most of respondents (42.5%) had a medium level of economic security, with 31.88 per cent having a low level and 25.62 per cent having a high level of economic security. The study area's total level of economic security was found 40.4 per cent, the lowest amongst all indicators. It is obvious during lock-down with added adverse weather conditions, the produce left unsold and unharvested leading the farmers to gain less income and forcing them into debt issues. Farmers have more propensity of getting the higher price than traditional marketing pattern through online e-NAM platform (*Bandhavya et al., 2022*) which aids in attaining the economic security during COVID-19.

Health security index: A thorough analysis of Table 2 revealed that 21 respondents (13.13%) had a low degree of health security, 89 respondents (55.62%) had a high level of health security, and 31.25 per cent had a medium level. According to the results, 81.87 per cent of the survey respondents and participants of the study reported a moderate to high level of health security probably due to the response of COVID-19, Government of Telangana implemented 'Test-Track-Treat' strategy for early detection of COVID. Along with national programmes like the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke, and National Tobacco Control Programme, the flagship programmes like Aarogyasri and Basti Dawakhanas were also implemented with the aim of providing health care services to the poor and vulnerable population.

Educational security index: A perusal view on the Table 2 revealed that a lion's share of individuals (45%) fell into the medium category of educational security. In contrast, 26.25 per cent of respondents had a high level of educational security compared to 28.75 per cent who had a low level. The total per centage of educational security was determined to be 50.6 per cent in the study area. Furthermore, 71.25 per cent of respondents said that they felt moderately to highly secure in their ability to pursue their education. The literacy rate of Telangana is increased by 6.3 %

from 66.5 per cent in 2011 to 72.8 per cent in 2018 aiming to achieve universal literacy rate in the state.

Social security index: According to a cursory glance at the results in Table 2, the large number of respondents (36.25%) had a medium level of social security. During the same time, 50 respondents (31.25%) had a high level of social security, relative to 32.50 per cent of respondents who had a low level. The total level of social security was determined to be 71% in the study area. From this pattern, it may be inferred that social security for farmers in the research region was satisfactory.

Institutional security index: A vivid examination at Table 2 indicates that 23.13 per cent and 17.5 per cent of respondents, respectively, reported high and low levels of institutional security, whereas 59.37 per cent of respondents experienced a medium level of institutional security. The analysis indicates that 82.5 per cent of respondents considered a medium to high level of institutional security, with the total institutional security level in the study area being 61.4 per cent. Rythu Vedikas also called as farmers training centres were being constructed under National State plan of Telangana (2020-2021) which act as a platform for farmers to motivate and enable them to generate high income and returns. The nearby agriculture universities might have given need-based assistance to farming communities in the study region, which often helped to strengthen their institutional security as evident through the findings.

Infrastructural security index: A thorough examination of Table 2 reveals that the majority of respondents (76.87%) had a medium level of infrastructural security. At the same time, 16.25 per cent of respondents had a low level of infrastructural security, while 11 respondents (6.88%) had a high level of infrastructure security. In the study area, the overall level of infrastructural security was found 72.9 per cent. According to the findings, 83.75 per cent of respondents had a medium to high level of infrastructural security. Telangana state is one of among the few states in the country with 100 per cent electrification of households and it has seen the greatest increase in per capita energy consumption between years 2018-2019. Mission Bhagiratha in Telangana made possible that every household in the state had access to drinking water. Mission kakatiya was launched in the year 2015 in Telangana state with catch line "our village, our tank" to restore the minor irrigation sources which are towards water conservation along with cost effective and cost-efficient water utilization. The above all are accounting to the infrastructural security of respondents in the study area.

Overall livelihood security: The overall livelihood security index score of respondent is obtained by multiplying the scores of seven sub-indicators of livelihood security with their respective weightages. It was observed from the results of Table 2 that among 160 respondents, larger number (42.50%) 68 of them fell in the category of medium level of 'Livelihood Security', whereas 49 (30.63%) respondents were having high level of Livelihood security followed by 43 respondents falling under low level of livelihood security. The research area, Telangana, was found to have an overall livelihood security score of 62.8 per cent. These findings are consistent with those of *Patidar (2019),* who constructed a livelihood security index for the combined states of Telangana and Andhra Pradesh and found that its average value was 0.614, which equals 61.4 per cent of livelihood security. In both research findings that were reported in the same study region, the value of the Livelihood Security Index was found to be substantially identical.

Different sub-indicators and their contribution to the respondents' total livelihood security : The different indicators of livelihood security are depicted in Fig.1 using a radar graph. Food security contributes the most, with an index value of 0.808, while economic security contributes the least, with an index value of 0.404. The results correspond with *Dhakade (2020)*, who concluded that Food Security had the highest contribution with an index value of 0.725, but they contradicted with *Lal (2015)*, who reported that respondents' Educational Security had the highest index value of 0.506. The highest index value of Food security was due effective operation Of Public Distribution system enabling the state to distribute 20 lakh metric tonnes of rice per year at Rs.1. Meanwhile, Economic security had the lowest index value of 0.404, which was in opposite to *Dhakade (2020) and Lal (2015)*, who reported that educational security (0.293) and infrastructure security (0.37) had the lowest index values, respectively. Only one sub-indicator in the index value of 0 to 1, Economic Security (0.404), is below the halfway mark, while the other indicators are above it.

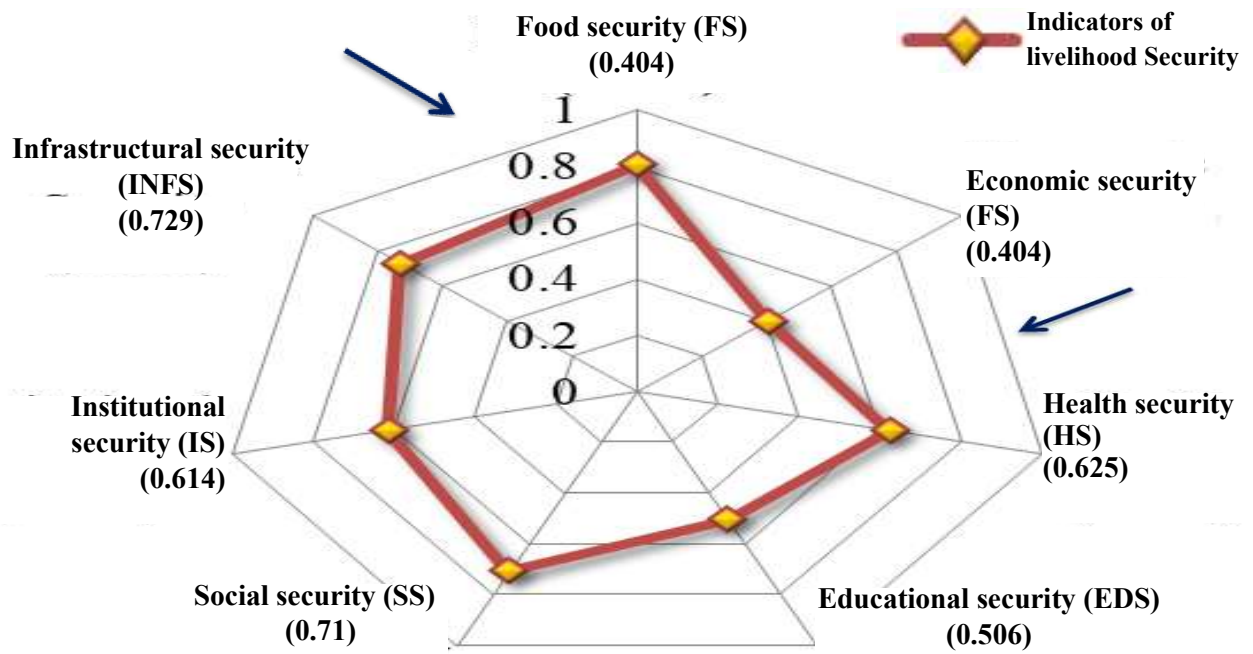*Robustness of regression analysis* : Before running

Fig. 1. Contribution of different sub-indicators to total livelihood Security of respondents
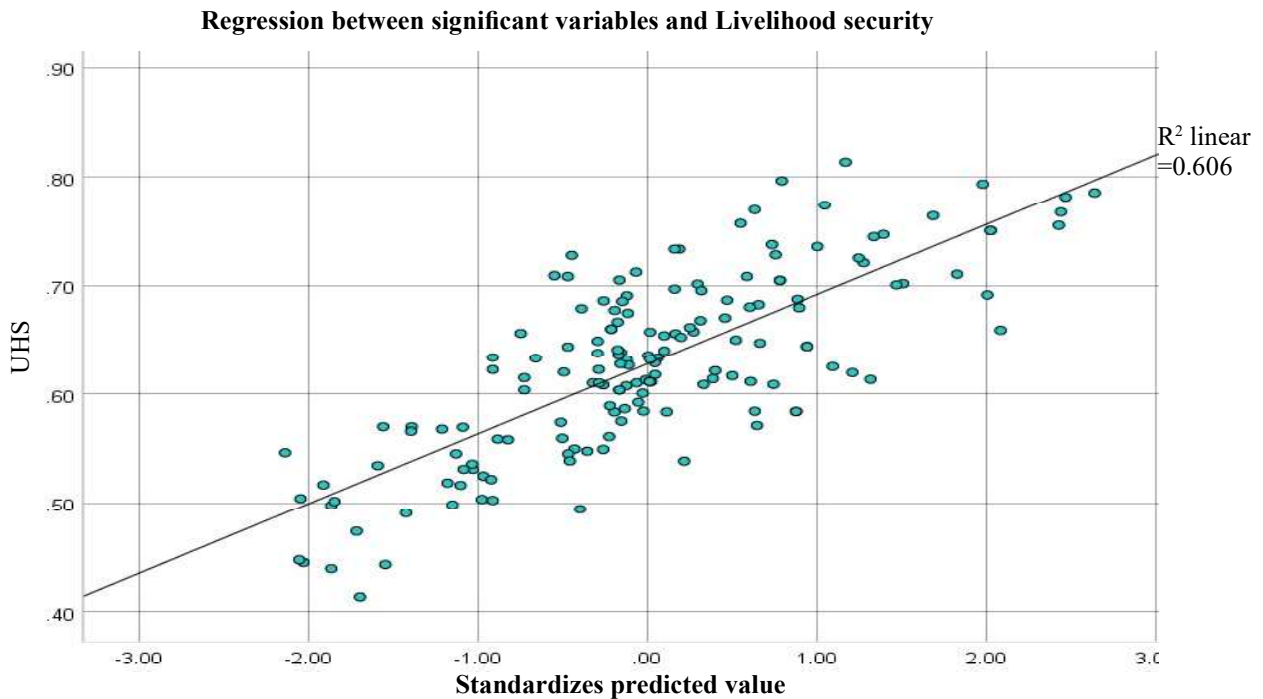

Fig. 2. R² linear standardized scatter plot graph showing regression between
significant variables and Livelihood security

Table 3. Model Summary of livelihood Security (Dependent variable) of the respondents

Model	R	R²	Adjusted R²	SE
1	.786ᵃ	.618	.582	.0533191

a. Predictors: (Constant), Risk Orientation, Family Size, Experience in farming, Livestock holding, Social Participation, Level of Aspiration, Land-holding, Occupation, Mass media exposure, Self-Confidence, Extension Contact, Educational years, Age, Income.

b. Dependent variable : Livelihood Security

Table 4. Regression analysis between Livelihood security and various factors affecting it.

Variables (Factors)	Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.
	b	S.E	b-value		
(Constant)	.436	.038		11.453	.000
Age	.000	.001	-.027	-.305	.761
Family size	.007	.002	.160	2.860	.005**
Educational years	.004	.001	.297	3.909	.000**
Experience in farming	.000	.001	.034	.380	.704
Occupation	.000	.003	-.006	-.088	.930
Land-holding	.001	.001	.076	1.040	.300
Livestock holding	.004	.001	.156	2.714	.007**
Annual family income	.008	.003	.236	2.568	.011*
Social participation	.006	.002	.199	3.331	.001**
Mass media exposure	.003	.001	.161	2.002	.047*
Extension contacts	-.002	.001	-.106	-1.393	.166
Level of aspiration	-.001	.001	-.059	-.973	.332
Self-confidence	.001	.001	.036	.478	.633
Risk orientation	.003	.001	.152	2.120	.036*

R^2=0.618: **Significant at 1% probability level; *Significant at 5% probability level, S.E-Standard Error

regression model, its significance is tested through ANOVA at 159 degre of freedom [160(N)-1] and found to be significant at 1% level with F-value 16.181.The high R^2 value, modest standard error of the estimate (Table 3) and significant F-value suggest that the model's overall fit was satisfactory and acceptable. Furthermore, Table 3 revealed that multiple correlations(R) are 0.768 and R square, the coefficient of determination is 0.618, indicating that the 14 independent variables together were responsible for 61.8 per cent of the variance in livelihood security (dependent variable) among the sample of 160 respondents, while the remaining 38.2 per cent was due to other external factors which were not included in the research study.

Regression analysis of livelihood lecurity and selected independent variables : The regression analysis applied to the data provided to analyse the Livelihood security gave significant results (Table 4). The standardized and unstandardized coefficients and values signify the varying level of independent variable towards livelihood security. In contrary of the prior expectation among 14 variables, Age, Experience in Farming, Occupation, Land-holding, Extension contact, Level of aspiration and self-confidence have no significant influence on the dependent variable. The significant influence of other variables on Livelihood security is explained below:

Family size: it was found to be significant at p<0.01, with t-statistics value of 2.860. With one unit rise in the family size, the probability of Livelihood security was likely to increase by a factor of 0.160 (β-value). The increase in family size among the respondents increases the number of earning members in the family in the research locale, thereby showing such positive significance with livelihood security at 1% level.

Educational years: it is the total number of years spent by the respondent in education. Educational

years found to be significant at p<0.01 with t-statistics value of 3.909.The probability of Livelihood security is likely to increase by a factor of 0.297 with one unit rise in the educational years referring that respondents with more years spent on education can build logical thoughts that lead to rational decision-making during COVID-19 by aiding in livelihood security.

Livestock Holding: It was calculated using the weightage given by National Accounts Statistics.it was found to be significant at p<0.01 with t-statistics value 2.714. With one unit rise in the livestock holding was likely to contribute in the increase of livelihood security by a factor of 0.156 depicting the possession of livestock can be an asset, a secondary source of income and also aids in meals during COVID-19 making the respondents more livelihood secure than others.

Annual family Income: it was found to be significant at p<0.05 with t-statistics value 2.568. The probability of livelihood security is likely to increase by a factor of 0.236 with one unit increase in the Annual Family Income. During COVID-19 the income of a household is the main cause of disruption in livelihood making its significant influence on livelihood security.

Social participation: it was statistically significant at p<0.01 with t-statistics value 3.331. One unit rise in social participation by respondents predicts to increase livelihood security by a factor of 0.199

determining that people with active involvement and membership in social institutions/ organizations like NGOs, FPOs ,FPCs and some communal and religion institutions are showing greater livelihood security.

Mass media exposure: The respondents who obtain information about various aspects of agriculture through mass media channels along with exposure to melas and exhibitions are found to have more livelihood security than others. It was statistically significant at $p<0.01$ with t-statistics value 2.002. The probability of livelihood security is likely to increase by a factor of 0.161 with one unit rise in the mass media exposure of respondent. Also the exposure of farmers to ICTs (*Kumari et al., 2022*) and online marketing platform e-NAM (*Bandhavya et al., 2022*) can integrate the marketing activities during COVID-19 aid in improving the livelihood security of farmers.

Risk orientation: The respondent with more risk orientation during COVID-19 found to have more livelihood security than with respect to low-risk orienteers. Risk orientation was significant at $p<0.01$ with t-statistics value 2.120. One unit rise in the risk orientation corresponds to 0.152 factor increase in livelihood security.

R^2 linear standardized scatter plot: The R^2 linear standardized scatter plot graph is constructed against the dependent variable and the standardized predicted value i.e. all the significant predictor (independent) variables are transformed to standardized form and converted to one predicted value. Here only the significant independent variables are taken from the study. The standardized graph is more realistic with actual values varying from $-\infty$ to $+\infty$ (Fig.2: -3 to +3). The scatter plot graph of R^2 linear regression in the present study is between Livelihood security (LS) and Standardized predicted value depicting how different respondents were scatter over according their livelihood security. The respondents which were scattered on and near the slope were having medium level of livelihood security and the other residing above have higher level of livelihood secure with those of located below the slope with low livelihood security. R^2 linear line is intercepting the y-axis (LS) at the minimum value of livelihood security i.e. 0.414. The arrow above the slope in the graph was pointing out the only one individual with highest livelihood security (0.814) and below the respondent with least livelihood security. The R^2 linear in the graph was

0.606 less than the actual value (0.618) because only significant variables were taken for the graph.

CONCLUSION

In the present manuscript the determinants of Livelihood Security of farmers during COVID-19 are identified and livelihood security among rural community during COVID-19 is assessed. The overall results of the paper depicted that in the research study the Extent of Livelihood Security was 62.8% with the seven sub-indicators: Food Security with 80.80%, Economic Security (40.40%), Heath Security (62.50%), Educational Security (50.60%), Social Security (71.00%), Institutional Security (61.40%) and Infrastructural facility with 72.90%. It is portrayed from findings that only one sub-indicator economic security didn't cross the designated cut-off of 50% and had lowest index value of 0.404 as the farm-families are more prone to debts which are more severed due to shutdown of markets, the produce being unsold during lockdown period and the crops left without harvesting during COVID-19 due to unavailability of labour reduced their income making them economically unstable. From regression analysis it is evident that the educational years have the highest beta coefficient (0.297) compared to other independent variable making it more influential on livelihood security. In the research area majority of farmers (68%) possess medium level of livelihood security during COVID-19 and this can be improved by some policy implications in procurement of the produce to fetch fair and remunerative price and providing financial security to farmers during pandemic situations. It can also be suggested that diversification of incomes through different livelihood options can be best way to increase livelihood security during pandemics like COVID-19.

CONFLICTS OF INTEREST

The authors have no conflicts of interest

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