EXCELLENT PUBLISHERS

International Journal of Current Research and Academic Review

ISSN: 2347-3215 Volume 3 Number 12 (December-2015) pp. 31-44

www.ijcrar.com

The impact of a MGNREGA Program on Household Expenditure in Northern Rajasthan: Propensity Score Matching Approach

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KEYWORDS

MGNREGA, *Propensity Score Matching, Program impact, Rajasthan, India*

A B S T R A C T

The present study attempts to analyze the impact of a MGNREGA program on household expenditure in Northern Rajasthan. The study used primary data from 300 households following multistage random sampling method. To address impact of a MGNREGA program on household expenditure in the study area, the study used propensity score matching approach. The estimated result indicates that MGNREGA program has a significant and positive contribution to improve household monthly per capita expenditure. MGNREGA program has raised monthly per capita expenditure by Rs.438.5among the beneficiary households. ATT result shows actual effect of the programme on monthly per capita expenditure is because of MGNREGA program. Probit analysis showed family size, farm size, total annual income, livestock ownership, decision maker and his wife education level, dependency ratio, farming experience, irrigable land size,market distance and amount of off-farm income determined significantly household participation in the MGNREGA programme in the study area.

Introduction

Improving capabilities, assets and activities that rural people require for a means of living or improving rural livelihood is central agenda for Indian government for many reasons. The most recent Rangarajan expert group report (2014) indicates India is home to more than 363 million poor. The proportion of the population below the poverty line in India is 29.5 percent. Similar to other developing countries, majority of the poor (72 percent) in India live in rural areas (*ibid*). Furthermore, the Planning Commission (2014) report indicated that, of these 363 million people in the country who did not have incomes to access a consumption basket that defines the poverty line, 260.5 million lives in rural and 102.5 million in urban areas. According to World Bank newly revised official poverty line, 37 percent of India's population (or about 410

million people) falls below the poverty line, making the country home to one-third of the world's poor. Reduction of poverty in India is, therefore, critical for the attainment of national and international goals. In line with the available statistics, the incidence of poverty in India is a rural phenomenon (World Bank, 1990; Fields, 2000; World Bank, 2001).

Commenting on the importance of agriculture, the 2008 World Development Report observed that GDP growth originating in agriculture is on average at least twice as effective in reducing poverty as growth outside agriculture (World Bank, 2008). This answers why government of India believes agriculture is so important for economic growth and poverty reduction especially among the rural population. Thus, no country has been able to sustain a rapid transition out of poverty without raising productivity in its agricultural sector (Timmer C.P, 2005). Agricultural growth reduces poverty directly, by raising farm incomes, and indirectly, through generating employment and reducing food prices. There is a mass of evidence that increasing agricultural productivity has benefited millions through higher incomes, more plentiful and cheaper food, and by generating patterns of development that are employment-intensive and benefit both rural and urban areas. More importantly, it has provided the spur to economic development outside agriculture where growth and job creation are faster and wages higher.

Rajasthan state is the largest state in India geographically, but the poverty situation in this largest state is not different than Indian condition.Rural poverty as found in Rajasthan is nothing more than the concept of poverty of rural areas. The Indian government is committed to a reduction of poverty to the barest minimum and even eradicate if possible hence rural poverty alleviation has remained the declared goal for Central, State and district level governments. In order to reduce or eradicate poverty, since independence successive governments have launched several poverty alleviation programmes to curtail problem of poverty in the country and certain areas of the country such as northern part of Rajasthan. In 2006, Indian government has launched the largest and most ambitious social security and public works programme in the world, "Mahatma Gandhi National Rural Employment Guarantee Act" (MGNREGA).

Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) is the Government of India's largest rural development programme. The Act was notified initially in 200 most backward districts of the country w.e.f. February 02, 2006 and subsequently extended all over India in two phases. The programme aims at enhancing livelihood security of the rural poor by providing at least 100 days of guaranteed wage employment in a financial year to every household whose adult members volunteer to do unskilled manual work. The Act seeks to create durable assets and strengthen the livelihood resource base of the rural poor. The choice of works suggested in the Act address causes of chronic poverty like drought, deforestation, soil erosion, so that the process of employment generation is on a sustainable basis. Budget outlays for the program has increased from Rs Crore 11300 in 2006/7 to Rs Crore 33000 in 2012/13 and 4.48 crore households were provided employment in 2012/13(GOI,2013).The programme has contributed a lot in changing rural livelihood in India and particularly in Northern Rajasthan. But, the program impact on household per capita expenditure is not addressed in the study area quantitatively.

This phenomenon calls for this study. The main objective of this paper is to investigate the impact of participation in MGNREGA programme on individual household monthly per capita expenditure in Northern Rajasthan of India, using a propensity score matching method.

Methodology

Sampling Technique

Multistage stratified random sampling procedure was adopted for the selection of 300 sampled respondents from Northern Rajasthan. Northern part of Rajasthan was purposively selected for this study because ofRajasthan is one of the largest states and MGNREGA programme is implemented in all districts.In the second stage, out of seven districts, giving equal chance for each district, three districts namely Bikaner, Sri Ganga Negar and Nagaur were selected. In the third stage, two *tehsils* from each selected district were selected randomly. Namely: in Bikaner district, Bikaner and Lunkaransar whereas in Sri Ganga Negar, Sadulshahar and Sri Ganganagar further in Nagaur, Merta and Khinwsar *tehsils* were selected randomly.In the fourth stage, three villages from each selected *tehsil* were selected randomly. Thus, totally eighteen villages from six selected *tehsils* were selected for further selection of households. In the fifth stage, list of all households residing in each selected village from village *Patwari and* voters list available in the village *Sarpanch* were applied to pick out targeted households' using systematic sampling technique. Hundred households were selected based on size proportional to household size from six randomly selected villages of a *tehsil* by using systematic sampling technique from each district. Thus, total three hundred household's primary data collected with the aid of interview using schedules administered by the researchers were however found useful for this study.

Analytical Techniques

An impact evaluation assesses changes in the well-being of individuals, households, communities or firms that can be attributed to a particular project, program or policy. Programme impact evaluation is aimed at providing feedback to help improve the design of programs and policies. The central impact evaluation question is what would have happened to those receiving the intervention if they had not in fact received the program. Since we cannot observe this group both with and without the intervention, the key challenge is to develop a counterfactual – that is, a group which is as similar as possible (in observable and unobservable dimensions) to those receiving the intervention. This comparison allows for the establishment of definitive causality – attributing observed changes in welfare to the program, while removing confounding factors.Properly designed impact measurement should properly address the magnitude of effects with clear causation. Such causal analysis tools such as propensity score matching is essential for understanding the relative effect of alternative interventions in reducing poverty.

The use of propensity-score matching techniques to estimate the effects of development policies has become a common approach not only for scholars, but also for policy-makers engaged in designing, implementing and evaluating projects in different fields. Propensity-Score Matching (PSM) method is increasingly applied currently in the policy evaluation community. In this study, propensity-score matching is used as standard to measure the impact of MGNREGA programme on

household expenditure. We are interested to get answer for "what is the effect of MGNREGA programme on household per capita expenditure"

PSM matching technique is observational (non-experimental) evaluation method and it uses information from a pool of units that do not participate in the intervention to identify what would have happened to participating units in the absence of the intervention. By comparing how outcomes differ for participants relative to observationally similar nonparticipants, it is possible to estimate the effects of the intervention.

The field of program evaluation is distinguished principally by cause-effect studies that aim to answer a key question: To what extent can the net difference observed in outcomes between beneficiary and non-beneficiary groups be attributed toan intervention, given that all otherthings are held constant?In program evaluation and observational studies in general, researchers are concerned about threats to internal validity. These threats are factors affecting outcomes other than intervention or the focal stimuli. There are nine types of threats; Selection bias is the most problematic one. Rosenbaum and Rubin (1983) proposed propensity score matchin gas a method to reduce the bias in the estimation of treatment effects with observational data sets. Propensity score models help to remove selection bias.

Propensity-score matching requires two main assumptions to correctly estimate the impact of a program.

Assumption 1 (Conditional Independence Assumption or CIA): there is a set X of covariates, observable to the researcher, such that after controlling for these covariates, the potential outcomes are independent of the treatment status:

$$(Y_1, Y_0) \perp D|, X \qquad (1)$$

The CIA is crucial for correctly identifying the impact of the program, since it ensures that, although beneficiary and non-beneficiary groups differ, these differences may be accounted for in order to reduce the selection bias. This allows the untreated units to be used to construct a counterfactual for the treatment group.

Assumption 2 *(Common Support Condition): for each value of X, there is a positiveprobability of being both treated and untreated:*

$$0 < P(D = 1| X) < 1 \qquad (2)$$

This second equation implies that the probability of receiving treatment for each value of X lies between 0 and 1. By the rules of probability, this means that the probability of not receiving treatment lies between the same values P (D = 0 | X) = 1− P (D = 1 | X). Then, a simple way of interpreting this formula is the following: the proportion of treated and untreated individuals must be greater than zero (positive) for every possible value of X. The second assumption, known as the Common Support or overlap condition, requires the existence of a substantial overlap between the propensity scores of treated and untreated units. If this assumption does not hold, it is impossible to construct a counterfactual to estimate the impact of the program. When these two assumptions are satisfied, the treatment assignment is said to be strongly ignorable (Rosenbaum & Rubin, 1983).

Estimating the Impact of a Program

The propensity score is the conditional probability of assignment to a particular treatment given a vector of observed covariates (Rosenbaum & Rubin, 1983, p.

41).It is simply the predicted probability from a probit or logit model regression and its goal is to achieve balance on covariates between treated and controls.After propensity scores have been estimated and a matching algorithm has been chosen, the impact of the program is calculated by just averaging the differences in outcomes between each treated unit and its neighbor.In this study, nearest neighbor matching was used to generate estimates of the impact of a MGNREGA programmeon household per capita monthly expenditure.

The impact of a MGNREGA programmeon household expenditure for an individual *i*, noted *δi*, is defined as the difference between the potential outcome in case of programme and the potential outcome in absence of programme:

$\delta_i = Y_{1i} - Y_{0i}$ ----------(3)

In general, an evaluation seeks to estimate the mean impact of the program, obtained byaveraging the impact across all the individuals in the population. This parameter is known as*Average Treatment Effect*or ATE:

$ATE = E(\delta) = E(Y_1 - Y_0)$-------(4)

Where *E*(.) represents the average (or *expected value*).

Another quantity of interest is the *Average Treatment Effect on the Treated*, or ATT, which measures the impact of the program on those individuals who participated:

$ATT = E(Y_1 - Y_0 \mid D = 1)$---------(5)

Finally, the Average Treatment Effect on the Untreated(ATU) measures the impact that the program would have had on those who did not participate:

$ATU = E\ Y_1 - Y_0(\mid D = 0)$---------(6)

In random assignment, all the characteristics of the individuals are equally distributed between beneficiary and non-beneficiary groups (i.e., the proportions are the same). On average, the groups will be identical, except for the fact that one of them received the treatment. This implies that:

$E(Y_0 \mid D = 1) = E(Y_0 \mid D = 0)$-----(7)

which allows one to replace the left-hand side (unobservable) with the right-hand side, which is observable, to estimate the ATT. Thus, experimental design ensures that the selection bias term is 0, and therefore, the impact of the program can be estimated as a simple difference between the average outcomes between groups.

$ATE = E(Y \mid D = 1) - E(Y \mid D = 0)$--------(8)

MGNREGA Programme Outcome Indicator

Investigating the poverty status of households using per capita expenditurecan help researchers and policy makers to evaluate the effectiveness of existing programs.Effectively integrating poverty status indicators into the monitoring and evaluation (impact assessment) systems of development programs willensure more efficient management of these increasingly scarce development resources and improve their ultimate impact on the lives and well-being of program beneficiaries (FAO,2003).

Minimum consumption expenditure per person or preferably per household will be used as standard of measurement to measure poverty. Poverty line is a monthly per capita consumption expenditure per person or a cut of living standard level below which an individual is considered to be poor

(Rangarajan, 2014, MoFED ,2013; Doyle, 2003; Ravallion, 1992).It typically specifies the income (or level of spending) required to purchase a bundle of essential goods (typically food, clothing, shelter, water, electricity, schooling and reliable healthcare). Identifying the poor as those with income (or expenditures) below a given line brings great clarity and focus to policymaking and analysis. Having a poverty line allows experts to count the poor, to target resources, and to monitor progress against a clear benchmark. Communicating the extent of poverty becomes easier, and explaining the notion of deprivation simpler.

In measure of extent of poverty, the choice of income or consumption expenditure as best indicator for living standard measurement of households is another point of debate. Government of India and most analysts prefer to use current consumption as an indicator of living standard measurement because income of the poor often varies over time. Particularly, this is true for rural based economies that depend on traditional production systems. On the other hand, consumption expenditure may reflect the purchasing power of households better than measured current income because recorded income during a survey may be distorted by transitory poverty situation. However, consumption shows relative stability due to a consumption smoothening effort from own saving, borrowing from others, or social risk sharing schemes. Rural households in developing countries also have the difficulty of excluding farm input costs from their revenue in estimating their income, and inaccuracy is tenable. Sometimes it is also common to have underestimated income figures as people are reluctant to give accurate information about their incomes (Atkinson, 1991; Chaudhuri&Ravallion, 1994; Deaton &Grosh, 2000; Deaton &Zaidi, 2002; Fields, 2001; Kyereme&Thorbecke, 1991).Therefore in this study, monthlyper capita expenditure which is one of the most direct indicators of living standard level of household in the study areawas considered as an outcome indicator to measure the impact of MGNREGA programme.

To get sampled household per capita expenditure, sampled household monthly food and non-food expenditure data was collected from 300 randomly selected households using questionnaire from three districts.Therefore, for this study a per capita expenditure per month difference between participant and non-participant was employed asoutcome indicatorto measure the impact of the MGNREGA programmein the study area.

Results and Discussion

Description of Sample Households' Characteristics

In Northern Rajasthan, MGNREGA programme is open to every household whose adult members volunteer to do unskilled manual work. Relative livelihood status is the main indicator variable that differentiates participants and non-participant in Northern Rajasthan. These variables are dominated by socio-economic variables like asset holding, education level, income and others. This study also focused mainly on these socio-economic variables to get the actual impact of MGNREGA programme on household's monthly per capita expenditure in the study area. Accordingly, table 1 depicts sampled households participation rate in MGNREGA programme.

As shown in Table 1, of 300 sampled households in the study area, 24 percent participate in MGNREGA programme but, majorities 76% were not participating in the program.

As shown in Table 2, MGNREGA programme beneficiaries and non-beneficiaries households had differences on certain livelihood indicator variables in Northern Rajasthan. In particular, the main differences between the two groups of households were observed with respect to per capita monthly expenditure, farm size, annual income, livestock holding, decision maker education level, irrigable land size and annual saving. Compared to non-MGNREGA programme beneficiaries, MGNREGA programme participant households had smaller farm and irrigated land size, smaller annual income and saving. Participants in the program household education level are less relative to non-participant and monthly per capita expenditure is smaller than non-participant households. This result is not surprising, as the main objective of the MGNREGA program is enhancing livelihood security of the rural poor households. To see the level of difference between MGNREGA programme beneficiaries and non-beneficiaries households, t-test was done and the result is presented on table 3.

Table 3 shows presence of statistically significant (*p*-value =0.042)difference in monthly per capita expenditure between MGNREGA program beneficiaries and non-beneficiary households in the study area. On table 2, average monthly per capita expenditure for MGNREGA program participant household is Rs.2125 whereas non-participant is 2745. The expenditure difference is Rs.(-)619.59 in each month between beneficiaries and non-beneficiary households. The negative sign indicates, MGNREGA program beneficiaries monthly per capita expenditure is less than non-beneficiary households. These results also agree with the pushing factor for the household to participate in MGNREGA program, is poverty which contributes for less expenditure. This result helps us to conclude that participants in MGNREGA program are households whose relative livelihood status needs additional income support to secure their monthly household expenditure. Furthermore, the averages monthly per capita expenditure for participant (Rs.2125) is more than poverty line in rural Rajasthan (Rs.1035.97), this indicates in the program non-poor households are participating to share the benefit.

The main interest of this study is to measure MGNREGA program impact by comparing a beneficiary with one or more non-beneficiaries who are similar in terms of a set of observed (socio-economic) characteristics through estimating the propensity scores matching method.

Propensity Score Matching

To apply propensity score matching, predicting the propensity scores for each individual using a probit or a logit model is essential. In this study, we used a probit model to predict the probability that a household participates in the MGNREGA program. Propensity scores were estimated by a probit model with the dependent variable coded as 1 for MGNREGA program beneficiaries and 0 for non-beneficiary households. Potential socio-economic variables assumed to contribute for household's participation and non-participation in the MGNREGA program are presented in table 4 were included as independent variables in probit model

In Northern Rajasthan status of livelihood indicator variables significantly influenced household participation in the MGNREGA programme. As shown in table 5, family size, farm size, total annual income, livestock ownership, decision maker and his wife education level, dependency ratio, farming experience, irrigable land size, market distance and amount of off-farm income determined significantly household participation in the MGNREGA programme in the study area. Majority variables have inverse (negatively) effect or their size decrease household's participation in MGNREGA programme, but family size and dependency ratio were positively and significantly influenced household participation in the programme.

Following probit analysis toestimate propensity scores, a nearest neighbor matching estimator was used to compute the impact of the MGNREGA programme among beneficiaries and non-beneficiaries' households on monthly per capita expenditure. Matching helps to get answer for what would have happened to participating units if they had not participated?

Matching

To improve the quality of the matches to trusting the Average Treatment Effect on the Treated(ATT) estimation "common support" restriction was imposed. ATT measures the impact of MGNREGA program on those individuals who participated in the programme. The STATA output indicated the region of common support was between [0, .970], which clearly satisfies our *assumption-2*.Probability of participation in the programme, conditional on observed characteristics, lies between 0 and 1 (implying participation is not perfectly predicted, that is, $0 < P(D = 1 | X) < 1$. Balancing property satisfied and the final number of blocks was 7. This number of blocks ensures that the mean propensity score is not different for participant and non-participant in theprogrammein each blocks and balancing was checked by testing that the means of each covariate do not differ between participant and non-participant units. Summarized output shows that balancing property was set and passes the balancing tests at the 95% level of statistical significance.Hence, we ensured that the mean propensity score was not different for theprogrammeparticipantsample and the sample of non-participant at various levels of propensity scores. Significant coefficients in the estimated equation implied that MGNREGA program beneficiaries and non-beneficiaries households were different with respect to the corresponding variable.

The above table depicts quality of matching is to perform tests that check whether the propensity score adequately balances characteristics between the treatment (beneficiary**)** and control (non-beneficiary) group units. We need to check balancing status before trusting the ATT estimation on impact of the MGNREGA program on household's monthly per capita expenditure in the study area. The result on table 6 shows, after matching, the differences are no longer statistically significant; suggesting that matching helps to reduce the bias associated with observable characteristics and it implies a good balancing of the covariates. Following proper matching we can estimate the impact of the MGNREGA program on households monthly per capita expenditure using ATT estimation and calculate standard errors using bootstrapping of standard errors method.

Table 7 depicts summary of mean and median bias before and after matching. Matching reduced both mean and median

bias and this gives strength for the predicted effect of treatment (participation in MGNREGA program). Matching has reduced mean bias 51.5 to 39.5 and median bias 41.8 to 36.0. Almost mean and median bas balanced, which shows matching process has resulted good result.

The above unmatched and matched t-test statistics result depicts the effect of participation within MGNREGA program is positive (ATT). The "common support" restriction in our analysis improved the quality of matches for trusting the ATT estimation value. ATT result in the table shows actual effect of the programme on monthly per capita expenditure is because of MGNREGA program.

Table.1 Programme Participation Rate

Treatment	Sampled households	Frequency	Percentage
1	Beneficiary	71	24
0	Non- Beneficiary	229	76
	Total	300	100

Source: *Authors Computation Based on Field Data*

Table.2 Mean and Standard Deviation of Some Livelihood Indicator Variables for Program Beneficiaries and non-Beneficiary Subjects

Variable	**Non-beneficiary**		**Beneficiaries**		**Total**	
	Mean	**Std.Dev**	**Mean**	**Std.Dev**	**Mean**	**Std.Dev**
Per capita monthly expenditure in Rs.	2745	2506	2125	851.8	2598	2242
Family size	6.02	2.2	6.55	2.68	6.14	2.3
Farm size	6.53	5.6	3.02	2.99	5.7	5.3
Income(annual)	398,593	352,521	107,866	79,712	329,787	334,021
Livestock holding in (TLU)	2.97	2.62	1.99	2.27	2.7	2.57
Decision maker education level	6.87	5.33	2.14	3.34	5.75	5.32
Wife education	3.39	4.056	1.66	3.26	2.98	3.94
Dependency ratio	0.69	0.55	0.80	0.74	0.72	0.61
Experience	19.06	11.83	14.9	11.9	18.07	11.97
Irrigable land size	2.74	3.34	0.75	1.06	2.27	3.08
Market distance	13.15	8.63	15.97	10.45	13.8	9.15
Main road distance	3.71	4.61	5.13	5.35	4.04	4.83
Saving(annual)	55587.9	120651.7	4772	15321	43561	107810

Source: *Authors Computation Based on Field Data*

Table.3 T-test of the Monthly Per Capita Expenditure Between Program Beneficiaries and Non-Beneficiary Households

Monthly per capita expenditure	**Coef.**	**Std. Err.**	**t**	**P>|t|**
MGNREGA	-619.59	303.071	-2.04	0.042**
_cons	2745.047	147.4392	18.62	0.000*

Source: *Authors Computation Based onField Data.* Significance; 1%=*, 5%=**

Table.4 Description Variables used in the Probit Regression to Estimate Propensity Score

Treatment (MGNREGA)	Description	Type	Measurement	Expected sign
Dependent variable Treatment	Participation in MGNREGA program	Dummy	1 if yes, 0 otherwise	
Independent variables				
Family size	Number of people in household	Continuous	Number	+/-
Farm size	Size of the farm	Continuous	Hectares	-
Income	Total annual income	Continuous	Rupees	-
Livestock	Total number of livestock in TLU	Continuous	Number	-
Education	Decision maker education level	Continuous	Class level	+/-
Wife Education	Wife education level	Continuous	Class level	+/-
Dependency ratio	The number of dependents	Continuous	percentage	+
Experience	Number of years in Agriculture	Continuous	Number	+/-
Irrigable land size	Amount of farm under irrigation	Continuous	Hectares	-
Market distance	Regulated market distance	Continuous	Km	+/-
Main road distance	Distance from main road	Continuous	Km	+/-
Non-farm income	Total annual off-farm income	Continuous	Rupees	-
Saving	Total annual saving	Continuous	Rupees	+/-
Farm participants	Total number of farm participants	Continuous	Number	+/-
Months food gap	Number of months in food deficit	Continuous	Number	+/-

Source: *Authors Computation*

Table.5 Estimation of the Propensity Score using Probit Regression

Treatment (MGNREGA)	Coef.	Std. Err.	z	P>|z|
Family size	0.4141	0.7190	4.90	0.000***
Farm size	-.0863063	.0463941	-1.86	0.063*
income	-6.07e-06	1.53e-06	-3.97	0.000***
Livestock holding in (TLU)	-.1519756	.0664419	-2.29	0.022**
Decision maker education level	-.1622381	.0399772	-4.06	0.000***
Wife Education	-0.121	0.0461369	-2.93	0.003***
Dependency ratio	2.5011	0.30439	-1.86	0.063*
Experience	-0.114	0.01865	-3.81	0.000***
Irrigable land size	-0.00004	8.31e-08	-2.35	0.019**
Market distance	-.0525153	.0152622	-3.44	0.001***
Main road distance	.0366353	.0339293	1.08	0.280
Off-farm income	-6.31e-06	2.94e-06	-2.14	0.032**
Saving	-5.97e-06	5.94e-06	-1.01	0.314
No of farm participants	-.0943278	.1111888	-0.85	0.396
Months food gap	-.0413093	.0680155	-0.61	0.544
_cons	2.127322	.5267199	4.04	0.000*****
Log likelihood = -76.26 Number of obs = 300 LR chi2(15) = 175.81 Prob> chi2 = 0.0000*** Pseudo R2 = 0.5355				

Source: Authors computation based on field data.***Significant at less than 1% probability level, ** Significant at less than 5% probability level,*Significant at less than 10 % probability level*

Table.6 Balance Checking after Matching

Variable	Sample	Mean		% bias	% reduced |bias|	t-test	
		Treated (beneficiary)	Control Non- beneficiary			*t*	*p* >| *t* |
Family size	Unmatched	6.5493	6.0175	21.8		1.70	0.090
	Matched	6.5493	7.7606	-49.6	-127.8	-3.08	0.003
Farm size	Unmatched	3.0282	6.5284	-78.0		-5.05	0.000
	Matched	3.0282	1.0901	43.2	44.6	4.48	0.000
Income(annual)	Unmatched	1.1e+05	4.0e+05	-113.8		-6.89	0.000
	Matched	1.1e+05	4.0e+05	7.9	93.0	1.55	0.122
Livestock holding in (TLU)	Unmatched	1.997	2.9678	-39.6		-2.81	0.005
	Matched	1.997	.65535	54.7	-38.2	4.60	0.000
Decision maker education level	Unmatched	2.1408	6.869	-106.3		-7.05	0.000
	Matched	2.1408	0	48.1	54.7	5.40	0.000
Wife Education	Unmatched	1.662	3.3886	-46.9		-3.27	0.001
	Matched	1.662	1.3521	8.4	82.1	0.52	0.604
Dependency ratio	Unmatched	.80445	.69436	16.8		1.34	0.181
	Matched	.80445	.87559	-10.9	35.4	-0.66	0.509
Experience	Unmatched	14.901	19.063	-35.0		-2.58	0.010
	Matched	14.901	7.0986	65.6	-87.5	3.74	0.000
Irrigable land size	Unmatched	.75423	2.7404	-80.1		-4.92	0.000
	Matched	.75423	.12535	25.4	68.3	4.86	0.000
Market distance	Unmatched	15.972	13.148	29.5		2.29	0.023
	Matched	15.972	29.704	-143.3	-386.2	-9.44	0.000
Main road distance	Unmatched	5.1268	3.7083	28.4		2.18	0.030
	Matched	5.1268	2.8732	45.1	-58.9	3.27	0.001
Non-farm income	Unmatched	14118	1.0e+05	-70.5		-4.27	0.000
	Matched	14118	40704	-21.5	69.5	-4.21	0.000
Saving	Unmatched	4772.4	55588	-59.1		-3.54	0.000
	Matched	4772.4	8891.5	-4.8	91.9	-2.16	0.033
No of farm participants	Unmatched	1.8732	1.9345	-4.4		-0.31	0.757
	Matched	1.8732	1.3662	36.0	-727.7	2.63	0.009
Months food gap	Unmatched	1.9014	1.0349	41.8		3.15	0.002
	Matched	1.9014	1.3239	27.9	33.4	1.71	0.089

Source: *Authors computation based on field data*

Table.7 Summary of Mean and Median Bias Before and After Matching

Sample	Ps R2	LR chi2	p>chi2	Mean Bias	Median Bias
Unmatched	0.535	175.81	0.000	51.5	41.8
Matched	0.852	133.62	0.000	39.5	36.0

Source: *Authors computation based on field data*

Table.8 ATT Impact Estimation with Nearest Neighbor Matching Method

Beneficiaries (treat)	Non-beneficiaries (contr.)	ATT	Std. Err.	t
71	29	438.521	220.196	1.992

Source: *Authors computation based on field data*

Table.9 T-Test after Matching for Monthly Per Capita Expenditure

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Monthly per capita expenditure	Unmatched	2125.46	2745.05	-619.59	303.07	-2.04
	ATT	2125.46	1990.71	134.75	713.32	0.19

Source: *Authors computation based on field data*

Conclusions and Recommendation

In the study area, out of 300 sampled households in the study area, 24 percent participate in MGNREGA programme but, majorities 76% were not participating in the program. The main differences between MGNREGA programme beneficiariesand non-beneficiaries households were observed with respect to per capita monthly expenditure, farm size, annual income, livestock holding, decision maker education level, irrigable land size and annual saving. Compared to non-MGNREGA programme beneficiaries, MGNREGA programme participant households had smaller farm and irrigated land size, smaller annual income and saving. Participants in the program household education level are less relative to non-participant and monthly per capita expenditure is smaller than non-participant households. This result is not surprising, as the main objective of the MGNREGA program is to create job opportunity for poor rural households.

Monthly per capita expenditure between MGNREGA program beneficiaries and non-beneficiary households in the study area is statistically significant (*p*-value =0.042). Average monthly per capita expenditure for MGNREGA program participant household is Rs.2125 whereas non-participant is 2745. The expenditure difference is Rs.(-)619.59 in each month between beneficiaries and non-beneficiary households. The negative sign indicates, MGNREGA program beneficiaries monthly per capita expenditure is less than non-beneficiary households. This result helps us to conclude that participants in MGNREGA program are households whose relative livelihood status needs additional income support to secure their monthly household expenditure.

In Northern Rajasthan status of livelihood indicator variables significantly influenced household participation in the MGNREGA programme. Family size, farm size, total family annual income, livestock ownership, decision maker and his wife education level, dependency ratio, farming experience, irrigable land size,market distance and amount of off-farm income significantly determined household participation in the MGNREGA programme in the study area. Majority variables have inverse (negatively) effect or their size decrease household's participation in MGNREGA programme, but family size and dependency ratio were positively and significantly influenced household participation in the programme.

Matching reduced both mean and median bias and this gives strength for the predicted

effect of treatment (participation in MGNREGA program). Matching has reduced mean bias 51.5 to 39.5 and median bias 41.8 to 36.0. Almost mean and median bas balanced, which shows matching process has resulted good result. The estimated ATT result indicates that MGNREGA program has a significant and positive contribution to improve household's monthly per capita expenditure. Rs.438.521 is difference between outcomes on 50 beneficiaries and outcomes on 15 non-beneficiaries after matching using nearest neighbor matching method. If a given household is beneficiary withinMGNREGA program, his monthly per capita expenditure increased by Rs.438.5per month. ATT result shows actual effect of the programme on monthly per capita expenditure is because of MGNREGA program.The program has positive impact in reducing poverty; government should strength the implementation and monitoring and evaluation strategies to alleviate poverty in rural India.

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