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Financial inclusion also leads to social inclusion—myth or reality? Evidences from self-help groups led microfinance of Assam

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Abstract

Microfinance is globally trusted for corroborating the upliftment of the rural vulnerable poor sections. It is looked upon as a means of credit-based poverty alleviation through financial inclusion. India also witnesses the same. In India, the self-help group bank linkage programme (SHG–BLP) is architected by NABARD in 1992 as a pilot project. The programme was mainstreamed in 1996 to link unorganised with the formal financial sector. In Assam, microfinance services are made available through SHG–BLP registered under Deendayal Antyodaya Yojana–National Rural Livelihoods Mission. Central Assam is the epicentre of operative SHG–BLP. This backdrop motivates us to explore the contribution of SHG–BLP in financial and social inclusion of the marginalised rural people of central Assam. Two self-developed indices, viz., financial inclusion index and social exclusion index are constructed by applying Multiple Correspondence Analysis. The impact analysis is facilitated by the Propensity Score Matching method. The study concludes that the SHG–BLP is successful in ensuring financial inclusion and simultaneously also assists in reducing social exclusion among the stakeholders.

Keywords: Self-help group bank linkage programme, Financial inclusion index, Social exclusion index, Multiple correspondence analysis, Propensity score matching, Central Assam

Introduction

Microfinance is a globally accepted model of financial inclusion for marginalised and vulnerable rural poor. The objective of Indian government is reflected in its manifesto and the objective is *Sabka Vikas Sabka Saath*[®] (development for all). To achieve this goal the government entrusted on microfinance model for rural India. Moreover, all the United Nations Member Countries adopted the 2030 Agenda for Sustainable Development in 2015 with the aim of prosperity for people and the planet, now and also in future (United Nations, <https://sdgs.un.org/goals>). The principles of Sustainable Development Goals are embedded in the 17 manifested goals. The SDGs aim to make the globe hunger and poverty-free. Obviously, it is difficult to achieve such a goal for the poorest and the vulnerable sections of the society without active institutional intervention. Thus, the Agenda embraces broad targets aimed at promoting social justice and fostering inclusive

and participatory decision making for all. In a nutshell, the accomplishment of the SDGs implies people everywhere, irrespective of the social status, will be socially included. Although there is no universal concurrence regarding the definition or the benchmark of *social exclusion*, the United Nations, (2016), defines “...*social exclusion as a state in which individuals are unable to participate fully in economic, social, political and cultural life, as well as the process leading to and sustaining such a state*”. *Social exclusion* is a barrier to exchange knowledge among people. In India, SHGs led microfinance finance was implemented to enhance the socio-economic status of the rural poor and vulnerable sections. This goal is enshrined in the “*Swarnjayanti Gram Swarajgar Yojana (SGSY)*” as well as in “*National Rural Livelihoods Mission (NRLM)*” and currently in “*Deendayal Antyodaya Yojana–National Rural Livelihoods Mission (DYA–NRLM)*”. In India, the most plausible model for SHGs functioning is the *Bank Linkage Programme*, architected by NABARD. These SHG–BLP and/SBLP are registered under SGSY earlier, then under NRLM and *DYA–NRLM* currently. Thus, the SHGs’ in India are focusing on a single goal of socio-economic inclusion of rural vulnerable and poor sections. Assam is not an exception in this case. Emphasis is thrust on SHG–BLP performance for accomplishing the goals and targets of SDGs in India and Assam. Hence, it will be pertinent to explore the impact of SHGs simultaneously on financial inclusion and social exclusion, particularly, for a backwards region of India, like Assam. Unfortunately, very few researchers in India are exploring this field considering Assam. Studies by Devi and et al., (2012); Dinesha, (2017); Maity and Sarania, (2017); Maity, (2019), are worth mentioning in this case. However, the potency of SHGs for both financial and social inclusion is not yet investigated for Assam. The studies related to SHGs are area-specific, because the implication of SHGs performances depends on the *social, cultural, economic and political (SCEP) factors*. The similar social, economic, cultural and political backgrounds are a priori conditions for footprint analysis. Thus, there is a research gap for Assam in this respect and it will be appropriate to explore and study the aftermath of SHGs in Assam, considering a specific region, where a priori conditions are fulfilled. With this backdrop, the current paper concentrates on exploring *the efficacy of the SHGs led microfinance programme on improving financial inclusion and abbreviating the social exclusion of the participating vulnerable rural poor households*.

Earlier literature

Comprehensive studies concentrate on the efficacy of microfinance on employment and income generation, poverty reduction, asset creation, social–economic empowerment of rural poor women and advancement of financial inclusion. However, the earlier studies lack consensus in their findings.

Microfinance institutions are capable of achieving financial inclusion for the excluded groups and regions including women (Chavan et al., 2009). Imai and et al, (2010), Nguyen, (2008), Pitt et al., (1998), Smith et al., (2005), Yaron and et al., (2018), pinpoint microfinance as a successful instrument for reducing poverty and inequality among the participants. Earlier studies documented that the SHG-led microfinance programme becomes a successful model for income and employment generation (Deepika et al., 2014; Marr & Tubaro, 2011; Panda et al., 2011). However, existing literature also shows the partial success of the SHG-led microfinance model (Phan, 2012; Weldelessie, 2017).

The SHG bank linkage model helps in improving the formal institutional credit flow among landless and marginal farmers discourages non-institutional borrowing through thrift creation and results in a higher level of financial inclusion than that of non-members (Islam, 2012; Prathap, 2011; Rangappa et al., 2009). In fact, SHG-led microfinance also helps in reducing multidimensional poverty (Maity, 2019). SHG-bank linkage program is also found to contribute significantly to the reduction of regional disparities (Pokhriyal et al., 2011). Financial inclusion results in human development across Indian states (Bagli & Dutta, 2012). The roles of self-help group movements and microfinance institutions are important for rural farmers, rural non-farm enterprises and other vulnerable groups in India (Dev, 2006). However, the level of financial inclusion is found to be low in the northeastern region of India (Bhanot et al., 2012). Different microfinance institutions such as MFIs, SHGs, and RRBs have a specific role in achieving the goal of financial inclusion in particular and inclusive growth in general (Archana, 2013). In Karnataka, SHG–BLP becomes a successful model for the stakeholders specifically for the downtrodden classes and the effectiveness of the model is universally true (Swamy, 2019). SHG is considered a well-accepted framework for inclusive growth, sustainable development and women empowerment and when artificial intelligence in banking is clubbed with the SHG operation it becomes a more powerful framework for achieving the same (Kandpal & Khalaf, 2020).

Impact analysis of microfinance is conducted using the propensity score matching (PSM) method (Cintina & Love, 2019; Duvendack & Palmer-Jones, 2012; Khachatryan, et al., 2019; Lyngdoh & Pati, 2013; Setboonsarng & Parpiev, 2008; Silva, 2012). There are limited numbers of studies which consider Assam as the study area (Devi et al., 2012; Dinesha, 2017; Maity, 2019; Maity & Sarania, 2017). However, empirical impact analysis is rare in these studies. Only Maity and Sarania, (2017) and Maity, (2019), discussed the impact of SHG–BLP on employment generation, poverty alleviation and financial inclusion by utilising PSM. MFI-led microfinance loans improve the relative income position of the poor in developing countries and thus help in reducing income inequality (Miled, et al., 2022). Furthermore, MFI-led microcredit improves saving practises, loan access, training for skill development, and ultimately develop women's entrepreneurship, business exposure (Abebe & Kegne, 2023; Mengstie, 2022). Accordingly, participation in MFI-led microfinance results in economic empowerment for women (Mengstie, 2022). Following earlier studies, the current paper has also chosen the PSM method for analysing the impact of the microfinance programme.

The rationale of the study

Assam is one of the seven states in the northeastern region. The state is broadly divided into two river valleys, viz., Brahmaputra and Barak River valleys. Assam shares international borders with Bhutan and Bangladesh. The state is bordered by Nagaland and Manipur in the east, Arunachal Pradesh and Bhutan in the north, Meghalaya, Tripura, Mizoram and Bangladesh in the south and the west there is West Bengal. The state is connected with mainland India through the 22 km Siliguri corridor, which is known as the chicken neck (Fig. 1).

In Assam, SHGs formation started in the early 1990s. In fact, the state became the epicentre of the SHG-Bank Linkage Programme (SBLP) since its inception. Assam is

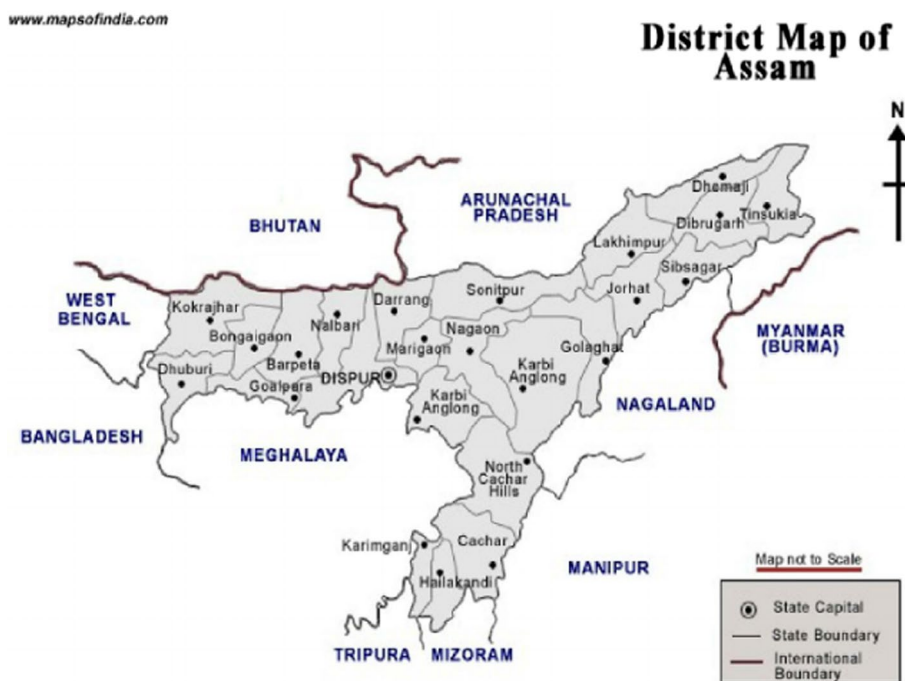


Fig. 1 Map of Assam

divided into five administrative divisions, viz., Barak Valley (3 districts), Central Assam (6 districts), Lower Assam (11 districts), North Assam (4 districts) and Upper Assam (9 districts). In *Central Assam* there exists a large chain of active SHGs compared to other parts of Assam. These SHGs are registered under earlier SGSY and presently DYA–NRLM (<https://daynrlmbl.aajeevika.gov.in/>). It is noteworthy that *Central Assam* comprises three plain and three hill districts; Dima Hasao, East Karbi Anglong and West Karbi Anglong are the hill districts and Nagaon, Morigaon and Hojai are the plain districts. However, the proposed division is planning to separate the hill region from the plain of *Central Assam*, as *Assam Hills*.

The socio-economic conditions, population structures and literacy rates of all three plain districts are similar. Among all the three plain districts Nagaon recorded the top slot followed by Morigaon and Hojai districts in providing group loans (NABARD, 2018–19). In fact, Nagaon has the highest share of operative SHGs in Assam (DYA–NRLM Report, 2018–19). The total numbers of operative SHGs in Nagaon, Morigaon, and Hojai are 15,868, 7699, and 6104, respectively, aggregating, 29,671, accounting for almost 74 per cent of total operative SHGs in *Central Assam* and 13 per cent of total operative SHGs in Assam. (DYA–NRLM Report, 2018–19). The population structure of these three districts is diversified. These districts are the residence of the vulnerable poor rural population, viz., Dimasa tribes, Hindu and Muslim lower class and lower caste people. The diversified population structure of these three districts is presented in Table 11 in the appendix. While the Nagoan district is Muslim-dominated, the Hindus are the majority of the population in the Marigaon district. On the contrary, the Hindu and Muslim populations are almost the same. The “Assam Human Development Report” includes poverty statistics for Nagoan and Marigoan only (see Table 11 in appendix) and

according to that report for both districts, the poverty ratios are higher than all Assam (37.0%). The corresponding figures for poverty ratio in both districts are higher for both SC and ST populations are higher than all Assam figures (SC: 37.5% and ST: 40.5). This background motivates us to consider these three districts of *Central Assam* for our study.

The study is novel in assorted ways. The uniqueness of the study lies in the choice of the study area. This is perhaps the first of this kind in the concerned area. Although some studies address Nagaon for SHGs impact assessment no earlier research explores all three plain districts for SHGs impact analysis. Second, the objectives of the current study are to make it nonpareil; earlier studies only concentrate on analyzing the impact of SHGs on financial inclusion for the vulnerable section of the rural poor. In this sense, the present study is complementary to the ongoing research, SHGs impact analysis on financial inclusion for the vulnerable rural poor. However, the present study contributes by taking a step beyond the SHGs impact analysis on financial inclusion to examine its potential for social inclusion. The achievement of seventeen SDGs implies social inclusion which is the contemporary goal of the *central government* as reflected in “*Pradhan Mantri Mann Ki Baat*” as “*Sabka Vikas Sabka Saath*”. Accordingly, this paper is an attempt to scrutinize the role of SHGs in Assam in accomplishing the central goal of “*Sabka Vikas Sabka Saath*”.

The paper is organized into five parts, as follows: after presenting an overview of the microfinance programme we have discussed the justification of the study. Section “[Methods](#)” sketches the sample design and enlists data sources; the methodologies adopted for the study and research findings are presented in Sect. “[Results and discussion](#)”. The possible reasons for the empirical findings are presented in Sect. “[Discussion](#)”. The conclusion as well as suggestions for induced policy measures is provided in Sect. “[Conclusions](#)”.

Methods

This section discusses the data source and the methodology for exploring the said objectives empirically.

Research philosophy and design

The current concern of the Indian government is reflected in the government’s *manifesto* “*Sabka Vikas Sabka Saath*” (development for all through participation). It is only achieved by corroborating social justice for all. In fact, it was the primal objective of architecting the SHG programme by NABARD. The SHGs were initially registered under “*Swarnjayanti Gram Swarajgar Yojana (SGSY)*”. Later all SHGs were registered under “*National Rural Livelihoods Mission (NRLM)*” and currently SHGs are in “*Deendayal Antyodaya Yojana–National Rural Livelihoods Mission (DYA–NRLM)*”. The main objective never changed during the process of transition. Apparently, this particular objective of microfinance makes it an instrument to achieve the “*Difference Principle*” of Rawls’s Theory of Justice (1971). According to Rawls, (1971), the “*Difference Principle*” offers a liberal character to the “*Theory of Social Justice*”. The achievement of the “*Difference Principle*” is only possible by ensuring paramount improvement of the “*least-advantaged group in society*” (Rawls, 1971). Unfortunately, researchers show the least

interest to explore microfinance as an instrument to achieve Rawls, (1971), “*Difference Principle*”.

This philosophical background helps us to frame the appropriate objectives to explore the efficacy of the SHG–BLP for the marginalised and vulnerable. Based on this philosophical background we have framed our above-mentioned objectives.

Data

The study is based on both primary and secondary data. The secondary data are utilised to develop the profile of the study area to facilitate the selection of the study area. The present study utilises secondary data sources, such as the NABARD Report, Status Reports of Microfinance in India published by Microfinance India, DRDA unpublished report of respective districts and Block offices to draw the profile of the study area.

Sample design

The empirical analysis of the present paper is mainly conducted based on the novel data set that has especially been collected for exploring the mentioned objectives. We adopted the stratified-multistage-random sampling technique. The stratification is performed based on the districts of Assam. In the *first stage* out of six districts of central Assam considering socioeconomic and demographic conditions, three districts, viz., Nagaon, Marigaon and Hojai are selected purposively. From the selected districts only *intensive blocks*¹ are selected for sampling (see Table 10 in appendix) in the *second stage*. Out of six, two intensive blocks are selected purposively from the Nagaon district with the characteristics of one nearest and another farthest from district headquarter. On the contrary, all the intensive blocks from Marigaon and Hojai (see Table 10 in appendix) districts are selected for the study. In the *third stage*, 4% of the total SHGs from the selected intensive blocks are selected purposively with the characteristics that 50% SHGs are nearest and the rest are farthest from the block headquarter. By utilizing Krejcie, and Morgan, (1970), formula we determine the number of participants and non-participants for each selected SHG to be sampled. The total numbers of SHGs, participants and non-participants are presented in Table 1.

The *treatment group* comprises those SHG participants who *received the benefits of an SHG-loan, at least 2 years before the survey*. The total number of 310 participants and 465 non-participants are selected by following the random sampling technique for the final interview. It is noteworthy that the *non-participants are who have not availed of any benefit of the SHG programme*. They create the control group. As per the *AIMS Guidelines, the control group are constituted to reflect the socio-economically comparable group to remove biases while estimating the programme impact* (Barnes & Seban, 2000; Maity & Sarania, 2017). Thus, a total of 775 respondents comprise the sample frame for the study. The relevant information from the selected treated and control group members are collected through the interview based on the pre-tested

¹ According to DYA-NRLM, Intensive blocks are those blocks where State Rural Livelihood Missions (SRLMs) directly enter with their own staff at the block level and take support of the internal resources from the resource blocks to form new SHGs or promote the existing SHGs by providing assistance. Community Resource Persons (CRPs) are chosen from the resource blocks to accelerate the implementation of programmes in these blocks. On the contrary, non-intensive blocks are those where DYA-NRLM strengthens existing SHGs in these blocks with some capacity building and limited financial assistance. No new mobilization would be done in these blocks.

Table 1 Profile of the sample SHGs

District	Blocks	Respondents	SHGs	Members sampled
Nagaon	Barhampur	Participants	29	58
		Non-participants		87
	Dolongghat	Participants	30	60
		Non-participants		90
Morigaon	Laharighat	Participants	48	96
		Non-participants		144
	Mayong	Participants	8	16
		Non-participants		24
Hojai	Binakandi	Participants	40	80
		Non-participants		120
Total			155	775

Source: Authors’ own specification based on unpublished secondary data collected from District DRDA Office, up to January 2019

Table 2 Summary results of *t* test conducted in quantitative variables

Variables	Respondents	N	Mean	S.D.	S.E.	Mean difference	Std. error mean difference	t-Statistics
Age	Participants	310	31.474	6.503	0.369	1.343	0.461	2.913*
	Non-participants	465	30.131	5.950	0.276			
Education	Participants	310	5.577	3.362	0.191	0.483	0.255	1.896***
	Non-participants	465	5.095	3.634	0.169			
Agricultural land holding (In Bigha)	Participants	310	1.881	1.554	0.088	0.239	0.112	2.145*
	Non-participants	465	1.641	1.473	0.068			
Distance from Bank (in Km)	Participants	310	4.861	2.099	0.119	0.373	0.145	2.565*
	Non-participants	465	4.488	1.798	0.083			
Consumption expenditure	Participants	310	1906.710	484.884	27.540	496.839	30.389	16.349*
	Non-participants	465	1409.871	277.053	12.848			

Source: Authors’ Own Calculation Based on Primary Data

***Significant at 1 % level, ** Significant at 5% level, * Significant at 10% level

questionnaire in the *final stage*. The field survey was conducted from April 2019 to January 2020. The characteristics of the two group members and their households are presented in Table 2.

The table divulges that the treated and control group members are significantly different in terms of age, education, agricultural landholding (In Bigha), distance from a bank (in Km) and consumption expenditures (implied by significant *t* value). The impact of microfinance will be overestimated if we simply run naïve regression as the participants are significantly different from the non-participants. Thus, without

correction of the bias in terms of observable characteristics impact assessment will be an overestimation.

Methodology

In this section, we will discuss the methodologies to be used to scrutinise the said objectives.

Financial inclusion and social inclusion index: multiple correspondence analysis (MCA)

The concept of financial inclusion is multidimensional and there is no consensus among the researchers regarding the measures of financial inclusion. In nutshell, it may be interpreted as poor and low-income households' access and usage of basic financial services, viz., savings, credit and insurance available from formal institutions. The whole system must be convenient, flexible and most importantly reliable in the sense that savings are paid and insurance claims are received with certainty (GOI, 2008; Prathap, 2011; World Bank, 2005). Hence, financial inclusion indicates households' sustainable access to formal financial services, viz., money transfer, savings, credit, insurance etc. These are also an integral part of microfinance services. In the absence of a well-accepted financial inclusion index (FII), we have developed an FII considering indicators like households' access to credit, transaction services, savings and insurance (for details, see Table 8 in appendix) following Maity, (2019), Maity and Sarania, (2017), Prathap, (2011) and Rangappa et al., (2009).

Social exclusion is a multidimensional phenomenon. The concept is wider than materialistic deprivation. Poverty is one of the dimensions of social inclusion. Peleah, (2016), in UNDP Report, (2016), defined social inclusion as “*a state in which individuals are unable to participate fully in economic, social, political and cultural life, as well as the process leading to and sustaining such a state*”. United Nations, (2016), identified three areas of exclusion, viz., “*Economic exclusion, Exclusion from public services and exclusion from civic and political participation*”. Following Peleah, (2016), in UNDP Report, (2016), we have also constructed a self-developed social exclusion index. The modalities utilised for this purpose are presented in Table 9 in the appendix. Following Alkire and Foster, (2009), the higher the value of the index implies lower social exclusion and/or more socially included (for details, see Table 9 in appendix). The separate index for each dimension is calculated first and then a weighted average of the three dimensions is calculated to obtain SEI. The weights are equal for all the dimensions (Peleah, 2016 in UNDP Report, 2016). For indexing, the two well-accepted methods are Preference Indexing and Indexing by Principal Component Analysis (PCA). In the first method weights of the index, are selected according to the preference of the researcher and, therefore, largely involve the discretion of the researcher. This method of indexing is highly criticised by researchers. On the contrary, PCA for indexing is accepted by almost all researchers. However, PCA is not applicable if the modalities are categorical. The way out is the MCA, as *MCA allows one to analyse the pattern of relationships of several categorical variables* (Asselin, 2002). The modalities utilised for indexing (both FII and SEI) are categorical, and therefore, we used MCA for indexing.

When all the indicators are dichotomous the index for i th participant is obtained as follows:

$$FII_i = \frac{1}{K} (W_1 I_{i1} + W_2 I_{i2} + \dots + W_p I_{ip}) \quad (1)$$

where W_p = the weight (score of the first standardised axis, (score or $\sqrt{\lambda_1}$) of category p . I_p = binary indicator (0 or 1), which takes on the value 1 when the household has the modality, and 0 otherwise. K = ordinal categorical indicators.

The index so constructed lies between 0 and 1. In this case, FII “0” means complete financial exclusion and “1” means total financial inclusion. On the contrary, in the case of Social exclusion, the index value “0” means socially excluded and “1” means complete social inclusion.

Propensity score matching method and impact assessment

The propensity score matching (PSM) is the well-accepted method for comparing the outcomes of the treated and control groups. The method allows the researchers to draw causal inferences after correcting the observational biases between the two groups (Heckman, et al., 1998; Rosenbaum et al., 1983). The propensity score $[P(X)]$ is the conditional probability calculated based on observable characteristics of an individual or household who is treated or selected (Rosenbaum & Rubin, 1983). Being probability the balancing score value lies between 0 and 1. The probability of being treated can be obtained using any binary choice model (Probit or Logit) (Caliendo & Kopeinig, 2008) and in our case, we use the Probit model. The model specification is as follows:

$$P(Y) = P(D = 1|Y) = \phi(\alpha_1 Y_1 + \dots + \alpha_k Y_k) = \phi(\beta Y) \tag{2}$$

where $0 < \phi(\beta Y) < 1$ for all values of X and ϕ is the cumulative distribution function of the standard normal distribution. Equation (2) is non-linear, and therefore, parameters β are to be estimated by the maximum likelihood estimator.

The impact of the microfinance on the outcome indicators can be assessed by comparing treated and control with valid matches. Since propensity score is a balancing score, it provides valid matches between two groups.

Thus if Z^1 is the outcome indicator for the SHG programme participants ($D = 1$), and Z^0 is the outcome indicator for the non-participants ($D = 0$), then the mean impact is given as follows:

$$ATT_{\Delta PSM} = E_{P(X)}(Z^1|Y, D = 1) - E_{P(X)}(Z^0|Y, D = 0) \tag{3}$$

where ATT represents the Average Treatment effect on the Treated group. Two matching algorithms, viz., the Nearest-Neighbour Matching (NNM) and Kernel Matching (KM) are employed in this study to circumvent any shortcoming and to check the robustness of the estimated impact on the outcomes.

Results and discussion

This section presents the results of this study.

Propensity score matching estimator

The probability of being treated or participating in the SHG programme is determined by the *Probit model*. The variables that are likely to influence the participation decision of the individuals are presented in Table 3. The same table also presents the definition of

the predictors of the *Probit model*. These variables altogether determine the propensity score.

The robustness of the specification is reflected by the high Likelihood Ratio Chi-squares 293.17 (with a p value of 0.0000) and Pseudo R-squares 0.3813. The estimated model discloses that the probability of participating and borrowing from the SHGs is significantly related to age, size of agricultural land holding, cast, distance from the bank and consumption expenditures. The predictors, age, cast and consumption expenditures positively influence participation decisions. On the contrary, the predictors, agricultural landholding (In Bigha), and distance from the bank (in Km) are negatively influencing the participation decision. The average age of the treated group is approximately 31 years. Concerning age, our observation is that SHG participants are mainly poor housewives and young mothers who are busy taking care of their children. On the contrary, with growing age housewives after completing their household responsibilities involve themselves in money-earning activities more actively using their free time. Thus, women with average age of 31 years are more interested in forming SHG and getting a loan to start up their own businesses. This may be the reason for the significant influence of age in participation in the SHG programme.

The ranges of the estimated propensity scores are presented in Table 4.

The table divulges that the propensity score ranges from a minimum of 0.0119 to a maximum of 0.9998. Consequently, our common support region is [0.0119–0.9998]. The mean propensity score is 0.3993, implying Probit regression successfully predicts the participation of all observations in about 40 per cent of cases.

Checking for common support

The impact analysis of microfinance is facilitated by comparing the outcome indicators of the participants with that of the non-participants. A reasonable comparison is only possible when there is enough overlap between the treatment and control groups. By plotting the propensity score histogram we can check the common support region (Fig. 2).

The figure confirms the existence of considerable overlap in the propensity score distribution of both the treated and control group. This insinuates the satisfaction of the common support condition. It is noteworthy that we have used without replacement matching for using nearest-neighbour matching and Kernel matching algorithms; therefore, 310 participants are matched with 310 non-participants and we discard 155 observations from our analysis.

Checking for balancing between the two groups

Table 2 ensures that the treated and the control groups are significantly different in terms of the observable. However, for unbiased comparison between treated and control groups, we need two similar groups. The propensity score theoretically eliminates all the differences between two groups (participate and non-participate) in terms of observable. The test of *balancing covariates* helps us to test that the mean propensity score of treated and control groups is similar. Table 5 presents the test result.

Table 3 Probit regression model for the estimation of the propensity score

Dependent Variable: SHG participation Dummy (1 = participant; 0 = non-participant)

Iteration 0: log likelihood = - 521.07279
 Iteration 1: log likelihood = - 375.25153
 Iteration 2: log likelihood = - 374.48786
 Iteration 3: log likelihood = - 374.48758
 Iteration 4: log likelihood = - 374.48758

Number of observation = 775
 LR chi2 (7) = 293.17
 Prob > chi2 = 0.0000
 Pseudo R² = 0.3813

Variables	Definition	Coefficient	S. E.	Z-statistics	p > z
Age	Measured in complete years	0.027	0.009	3.02***	0.003
Education	Total schooling in completed years	0.011	0.015	0.75	0.452
Agricultural land holding (in Bigha)	Size of the operational land holding in Bigha	- 0.119	0.034	- 3.48***	0.00
Cast	Cast of the sampled household Dummy, if SC/ST = 1, 0 otherwise	5.042	0.460	10.95***	0.00
Religion	Dummy, if Hindu = 1, 0 otherwise	- 0.032	0.170	- 0.19	0.852
Distance from Bank (in Km)	Distance of the bank measured in km	- 0.088	0.028	- 3.19***	0.001
Consumption expenditure	Monthly household consumption expenditures measured in Rs	0.002	0.000	13.78***	0.00
Constant	-	- 0.091	0.168	- 0.55	0.585

Source: Authors' own calculation based on primary data

***Significant at 1% level. **Significant at 5% level. *Significant at 10% level

Table 4 Estimation of Probit for the whole sample: p-Score

Variable	Observation	Mean	Std. Dev.	Min	Max
P-Score	774	0.3993	0.2827	0.0119	0.9998

Source: Authors’ own calculation based on primary data

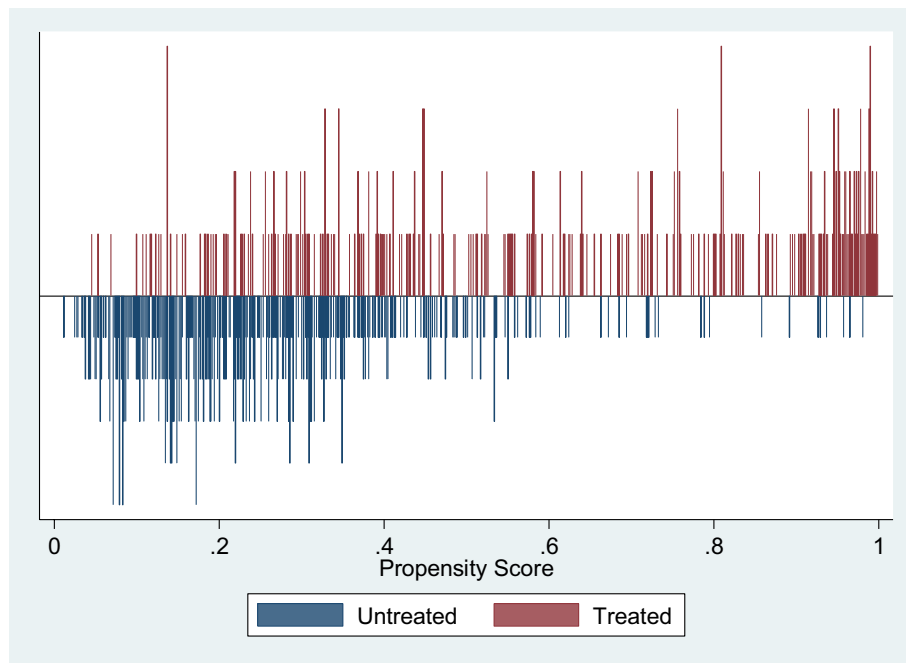


Fig. 2 Common support region

Table 5 Identifying the balance between two groups

Variables	Mean			t test	
	Treated	Control	% Bias	t	p> t
Age	31.47	29.77	3.0	0.26	0.797
Education	5.58	5.97	− 7.0	− 0.63	0.528
Agricultural land holding (In Bigha)	1.88	2.33	− 9.4	− 0.86	0.389
Cast	0.52	0.63	− 5.6	− 0.53	0.598
Religion	0.58	0.52	0.0	0.00	1.000
Distance from Bank (in Km)	4.86	4.35	2.5	0.21	0.833
Consumption expenditure	1906.70	1914.50	− 10.6	− 0.88	0.378
Pseudo-R ²	0.037				
LR chi2	3.52				
p> chi2	0.966				

Source: Authors’ own calculation based on primary data

Table 6 ATT estimates of SHG participation impact on financial inclusion and social exclusion

Impact indicators	Matching method	ATT				
		Treated	Controls	Difference	Std. Err.	t-Statistics
Financial inclusion	Nearest neighbour	0.52	0.41	0.12	0.01	7.99***
	Kernel	0.52	0.39	0.14	0.01	10.25***
Social exclusion	Nearest neighbour	0.35	0.28	0.07	0.01	6.29***
	Kernel	0.35	0.27	0.08	0.01	8.31***

Source: Authors’ own calculated based on primary data

***Significant at 1 % level, ** Significant at 5% level, * Significant at 10% level

The table offers a useful insight that the matching eliminates almost all the existing biases. This is apparent from the *t* test results which indicate all the differences in terms of observable covariates between the treated and control groups are eliminated after matching. Moreover, the sufficient low pseudo-*R*² after matching, implies that the matching procedure can balance the characteristics of the treated and control groups.

As all the pre-conditions are satisfied we can proceed for analysing the impact of the microfinance based on output indicators in terms of the *average treatment effect on the treated* (ATT), considering two matching algorithms, viz., the Nearest-Neighbour Matching (NNM) and Kernel Matching (KM).

Impact of microfinance on outcome indicators and sensitivity analysis

The impact analysis of the SHG lead microfinance programme is generally conducted based on the average treatment effect on the treated (ATT), the average treatment effect (ATE) and the average treatment effect on the untreated (ATU). However, since the results of the ATE and ATU are not testable, thus these estimates cannot be used to find the actual impact of the microfinance programme. Consequently, we consider ATT for exploring the impact of the SHG led microfinance programme. For the robustness of the result, we have used two matching algorithms, viz., NNM and KM. The result is presented in Table 6.

The estimated ATT of the microcredit on financial inclusion of the participants evidences an increment of FII on average 0.52 more than their similar non-participant counterpart and the result is significant at 1% level. This implies that the SHG-bank linkage programme under DYA–NRLM has shifted the participant household to a higher level of financial inclusion as compared to non-participant households.

The same table also divulges that the estimated ATT of the SHG led microcredit on social exclusion of the participants measured by SEI increase on average 0.35 more than their similar non-participated counterpart. The estimated difference is significant at the 1% level in the case of both matching algorithms. Thus, the participation in the SHGs led microcredit contributes to the social inclusion of the concerned individual and her family.

The possible reason for such empirical result is discussed in the “Discussion” section. Here, we next consider the sensitivity analysis of the result. It is necessary for the validity of the result. The output shows that we get a significant positive treatment

Table 7 Sensitivity analysis for average treatment effect

Outcome variables	Mantel–Haenszel (1959) bounds				
	Gamma	Q_mh ⁺	Q_mh ⁻	p_mh ⁺	p_mh ⁻
Financial inclusion	1	1.879	14.684	0.030	0.000
Social exclusion	1	- 0.061	0.524	0.000	0.000

Source: Author’s own calculation based on primary data

effect on the treated of 0.52 and 0.35 for FII and SEI, respectively. That is, the rate of betterment, measured in terms of FII and SEI, of participants, are 52.0 and 35.0 per cent higher than that of matched control group members. Under the assumption of no hidden bias ($\Gamma = 1$), the Mantel–Haenszel (1959) bounds, test statistic gives a similar result, indicating a significant treatment effect (Table 7).

Discussion

The table discloses documentary evidence of the significant impact of the participation of the SHG-led microfinance programme on both financial inclusion and social inclusion. The empirical result concludes that SHG–BLP under DAY–NRLM has shifted the participants to higher financial inclusion compared to their non-participant counterparts. This result is congruous with the earlier finding by Maity, (2019), Maity and Sarania, (2017), Prathap, (2011) and Rangappa et al., (2009). This outcome is quite obvious. While implementing both SGSY and DYA–NRLM special focus was thrust on vulnerable sections among the rural poor. Accordingly, it was aimed that SC/ST and women would account for at least 80 per cent of the “*swa-rozgaris*”(self-employed). Consequently, the SHGs members are mainly women and majorly housewives. These members earlier did not possess a bank account or rarely had access to banks. However, after becoming SHGs members they possess individual or joint bank accounts, develop banking knowledge and habits and in some favourable cases they started using ATMs. For the survival of the groups they repay the loan on time and in a few exceptional cases they take an insurance policy as an effect of knowledge sharing. All these steps help their transformation from financial exclusion to inclusion. Notably, although both participants (target group) and non-participants (control group) of SHGs must possess bank accounts, however, the participation ensures that they should use that bank account regularly. They must visit the bank at the time of repaying their part of the loan. On-time repayment of loan EMI escalates their likelihood of getting a new loan next time. During their meeting among the group members, the members develop banking knowledge and inspire to have insurance for their business as well as life. On the contrary, non-participants (control group) just form the group and received a loan from SHGs only. Most of them did not have any insurance policy or did not develop any banking habits link their participants’ counterparts. Under “Jan Dhan Yojana”, all Indian citizens are allowed to open a zero-balance bank account and such an account includes many more facilities including accidental insurance benefits to enhance the financial inclusion of Indian citizens. However, having only a bank account does not mean financial inclusion. We can consider owning a

bank account only a first step towards financial inclusion. The participants and non-participants of SHGs both have bank accounts means they have initiated their step towards financial inclusion. Over time the participation in SHGs as group members, viz., participants grow banking habits, like knowledge of banking procedures, usage of ATM/Debit Card/Cheque, possessing of Fixed Deposit or Recurring Deposit account with Institutional Agencies, applying for the institutional loan for personal purposes, etc., result in a higher level of financial inclusion than their non-participant counterparts. Thus, patently SHGs participation assists in attaining higher financial inclusion. One of the main components of DYA–NRLM is “*universal financial inclusion*”. Thus, SHGs are formed with this in-built objective and undeniably SHGs are performing to accomplish this goal.

The 2030 agenda *enshrined* the principle that people everywhere should acquire the benefits of prosperity and should lead to a decent standard of well-being. The announced seventeen “Sustainable Development Goals” aims to achieve this principle for each one. The effective translation of the goals and targets results in the essential components of “Social Inclusion”. Although there is no universally accepted definition and/or benchmark of *social exclusion*, generally, lack of participation in society is considered a *social exclusion*. In the present study following Alkire and Foster, (2009), the dual cut-off method we consider greater the value of *the Social Exclusion Index* (SEI) more the opportunities for the individual for social participation, and exchange of knowledge, implying more socially included. Participation in the SHGs-led microcredit contributes to the social inclusion of the concerned individual and her family. As mentioned earlier these housewives participants were rarely allowed to talk or visit others’ houses. SHG members discuss their family problems, like sending the girl child to school, having a personal toilet at the house, etc., and by exchanging their ideas and information with each other they try to overcome such problems. Moreover, not only do they become guarantors of each other’s loans but also they become knowledge partners in their extended family. Unfortunately, the lack of such research in the national and international areas restricts us from juxtaposing our findings with others. However, our findings are consistent with the earlier studies conducted by Devi and et al., (2012) and Dinesha, (2017).

This result is also not surprising. Following the guidelines of SGSY and DYA–NRLM, the members of the SHGs in central Assam are mainly women who belong to SC/ST class. Before forming the group they were housewives without any sort of economic decision-making power and excluded in terms of all the dimensions of social exclusion. However, after participation in the SHGs, they become earning members of the family and participate in the family decision-making related to the education of their children including girl children. The participation also enables them to overcome information asymmetry and thus enjoy improved cooking fuel through “*Pradhan Mantri Ujjwala Yojana*”, constructed toilets and improved drinking water facilities through “*Swachh Bharat Abhiyan*”. All these achievements are the direct impact of knowledge sharing. They are now empowered to invite their group members to their family occasions and also empowered to participate in those invitations. They are also empowered to cast their voting rights according to their choice. With the central and the state government’s initiatives these lower cast and class women contest in “*Panchayat*” as a candidate. All

such measures increase the corresponding scores of the participants in all three dimensions and as a whole improve their SEI score also. Therefore, *SHG participation makes the participants more socially included than their non-participated counterparts.*

Conclusions

The objective of this research was to examine the role of SHGs on financial inclusion and depletion in social exclusion. Social inclusion helps in sharing knowledge and thus enhances skill and knowledge. The study area of the research is the three districts, viz., Nagaon, Morigaon, and Hojai of Central Assam. The impact evaluation is administrated using the PSM method and the empirical results manifest that the programme is significantly successful in improving the financial inclusion and social inclusion status of the treated than the control group members. This result is in conjunction with the current objectives of the central government. The central objective is very clear from a single line “*Sabka Vikas Sabka Saath*” and it is reflected several times in “*Pradhan Mantri Mann Ki Baat*”. To achieve this goal central and state governments are working day and night. The result is the registration of SHGs in DAY–NRLM and many more. As a consequence of these continuous processes, we are getting a successful model of “*development and social justice for all*” through SHGs in interior India. In fact, the target group for DAY–NRLM is BPL families, especially women. Consequently, SHGs constitute the main target group under DAY–NRLM. A comprehensive number of studies have already been conducted to explore the efficacy of SHGs in uplifting the marginalised and vulnerable. However, it is highly commendable to pursue any geographically specific, discrete location-based research on the current concern. An area-specific study at the micro-level is highly commendable to investigate the efficacy of the such programme. Without conducting a *regional* study, it will not be appropriate to draw any conclusions about the efficacy of the “DAY–NRLM, SBLP”, the flagship programme of the Indian government.

Our empirical findings show that SHG participation not only shifted the participants to higher financial inclusion but also accredit them to enjoy higher social inclusion. The conclusion concerning higher financial inclusion of SHG members is not new and earlier studies also find the same result (Maity, 2019; Maity & Sarania, 2017; Prathap, 2011; Rangappa et al., 2009). Following this, we can say that more-or-less participation in the SHG programme leads to higher financial inclusion than their non-participant counterparts. Concerning social inclusion, we do not find many studies related to this. We failed to find any single study which explores the efficacy of SBLP for social inclusion. Based on our empirical findings we conclude that participation in the SHGs results in more social inclusion. The possible reasons are discussed in the discussion section. Irrespective of location we can say that participation of the SHGs ensures some kind of social inclusion as these housewives earlier rarely come out from home and were completely involved in household activities. After participation in SHGs, they involve in money-earning activities, have their small production and business units and discuss their ideas and knowledge, and participate in each other’s family ceremonies, which results in higher social inclusion. It is noteworthy that presently, these SHGs are formed through the personal know-how of the group members and thus

higher social inclusion becomes easier. If the groups are formed by “*Panchayat*” and the group members may or may not be known to each other then such a conclusion may not hold good. Thus, universality concerning SHGs efficacy in ensuring higher social inclusion depends on whether the group is formed through personal know-how or not. Although our study is location-based, however, the conclusions of the study are applicable to other areas provided the *apriori* conditions are fulfilled. Thus, SHGs may become equally successful in achieving higher financial and social inclusion for other Indian states if the basic characteristics of the study area matched with the other location and region-based study.

The theoretical underpinning of the present paper concludes that it is possible to measure the level of social inclusion through indexing. The PSM method is a universally accepted method for impact analysis and the empirical results based on such method empower us to generalise the conclusion. Moreover, as SHGs are formed based on personal know-how thus such empirical results may suffer from self-selection bias. Accordingly, it is important to validate the result by conducting a sensitivity analysis. The result of the sensitivity analysis makes us confident about the robustness of our empirical results.

Based on our empirical findings we suggest the following policy prescriptions:

First, it is highly recommended to encourage the SHGs bank linkage model. SHG–BLP almost in all location-based studies concludes higher financial inclusion for the participants. In addition, our empirical findings conclude SHGs also result in higher social inclusion. Such empirical results encourage us to recommend the wide spreading of the SHG–BLP model for all rural areas of India.

Second, as we said these SHGs are formed through personal know-how. However, the rule is that based on their willingness “*Panchayat*” will form the group irrespective of their religion and personal know-how. However, such formation of groups is rarely practised. If such group formation is possible in all cases then we may get a more realistic result and the efficacy of the SHG–BLP in achieving the objective of “*development and social justice for all*” may be tested appropriately.

Finally, whatever be the criterion of group formation there is no doubt about the success of SHGs in ensuring financial inclusion for the marginalised and vulnerable. Concurrently, the coverage of the SHGs registration under DYA–NRLM is advocated to expand. Concomitantly, to expand the functioning of SHGs the alternative model, viz., the MFI–Bank Linkage model is required to encourage.

One limitation of the study is that it focuses only on Central Assam. Moreover, the group maturity and length of microfinance participation can have an impact on the economic status of the households. To capture this we need a dynamic framework and that may be the *future scope of the study*. In the same in *future, we would like to extend our study* for Assam as a whole. Assam is diversified in terms of religion, caste and class. Accordingly, the study concerning the efficacy of the SHGs in resulting social inclusion will be more interesting.

Appendix

See Tables 8, 9, 10, 11

Table 8 FII indicators and their corresponding weights

Indicators	Sources of finance	Descriptions	Nature of the variable	Weights
Formal credit	From formal agencies directly and/or through SHG during Survey (during 2016)	Yes = 1 Otherwise = 0	Categorical	0.124
	From formal agencies directly and/or through SHG during Survey (during 2017)	Yes = 1 Otherwise = 0	Categorical	0.105
	From formal agencies directly and/or through SHG during Survey (during 2018)	Yes = 1 Otherwise = 0	Categorical	0.079
	Regular repayment of loan	Yes = 1 Otherwise = 0	Categorical	0.094
	Received loan during emergency	Yes = 1 Otherwise = 0	Categorical	0.087
Savings	Operating SB Account in Bank/Post office/ Co-operative Banks	Yes = 1 Otherwise = 0	Categorical	0.120
	Fixed Deposit or Recurring Deposit Account with Institutional Agencies	Yes = 1 Otherwise = 0	Categorical	0.087
	Savings in SHG	Yes = 1 Otherwise = 0	Categorical	0.101
Insurance	Any source/type of insurance	Yes = 1 Otherwise = 0	Categorical	0.110
Transaction services	Usages of ATM/Debit Card/Cheque	Yes = 1 Otherwise = 0	Categorical	0.085
Banking knowledge	Knowledge of banking procedure after joining SHG	Yes = 1 Otherwise = 0	Categorical	0.024
SHG operation	Facing problem of getting loan through SHG	Yes = 0 Otherwise = 1	Categorical	0.070

Source: Authors' own calculation based on primary data

Table 9 SEI indicators and their corresponding weights

Broad areas of exclusion	Indicators	Modalities	Weights	
Economic exclusion	Subjective basic needs	In the past 0 year household has not able to offered three meal a day or pay bill regularly, or keep the home adequately warm (if yes = 0, 1 otherwise)	0.06	
	Employment	Being unemployed or discouraged worker (if Yes = 0, 1 otherwise)	0.067	
	Financial service	Bank accounts owns name (if yes = 1, 0 otherwise)	0.027	
	Material deprivation housing	Cannot offered bed for every member (if yes = 0, 1 otherwise)		0.033
		Constructed toilet (if Yes = 1, 0 otherwise)		0.037
		Has Cement roof (if yes = 1, 0 otherwise)		0.075
		Has cement floor (if yes = 1, 0 otherwise)		0.012
	Material deprivation amenities	Household has washing machine, micro-wave and freez but cannot afford one (if yes = 0, 1 otherwise)		0.074
		Has mobile phone (if yes = 1, 0 otherwise)		0.068
		Has TV set (if yes = 1, 0 otherwise)		0.015
		Has bicycle (if yes = 1, 0 otherwise)		0.043
		Has four wheeler motored vehicle (if yes = 1, 0 otherwise)		0.074
	Material deprivation ICT	Household needs a computer or internet but cannot afford one (if yes = 0, 1 otherwise)		0.076

Table 9 (continued)

Broad areas of exclusion	Indicators	Modalities	Weights
Exclusion from public service	Public utilities	No public water connection (if yes = 0, 1 otherwise)	0.091
		No Sewerage system (if yes = 0, 1 otherwise)	0.107
		no Gas connection (if yes = 0, 1 otherwise)	0.044
		No Electricity (if yes = 0, 1 otherwise)	0.066
	Education	Could not afford to buy school materials for every child in past 00 moth (if yes = 0, 1 otherwise)	0.095
		Young children not in school or pre-school (if yes = 0, 1 otherwise)	0.09
	Health	Could not afford medication or dental checks for every child in the past 12 months (if yes = 0, 1 otherwise)	0.035
		Doctor consulted in case of medical needs (if yes = 1, 0 otherwise)	0.11
	Social infrastructure	Lack of opportunities to attend events due to distance (if yes = 0, 1 otherwise)	0.06
	Exclusion from civic and political participation	Social contact	Rare or infrequent social contract with family or relatives (if yes = 0, 1 otherwise)
Rare social contract with friends (if yes = 0, 1 otherwise)			0.057
lack of support network that could help in the events of emergency (if yes = 0, 1 otherwise)			0.088
Social participation		Since last 1 year household has not been able to invite friends or relatives for meal at least once a month (if yes = 0, 1 otherwise)	0.064
		Has not been able to afford to buy cinema tickets since 12 months (if yes = 0, 1 otherwise)	0.046
Civic participation		Inability to vote due to lack of eligibility or distance to polling station (if yes = 0, 1 otherwise)	0.102
		No participation/membership in associations, teams or clubs (if yes = 0, 1 otherwise)	0.024
		No participation in political/Civic activities (if yes = 0, 1 otherwise)	0.024

Source: Authors' own calculation based on primary data

Table 10 Administrative divisions of the selected districts

District	Geographical area (sq Km)	Population	Literacy (%)	Major occupation	HDI	Revenue circles	Blocks	Intensive blocks	Villages	Towns/Cities
Nagaon	2287	1,892,550	71.00	Agriculture and Allied	0.592	7	13	6	1210	4
Morigaon	1450.20	957,423	69.37	Agriculture and Allied	0.576	5	7	2	638	2
Hojai	21,219	36,638	81.08	Agriculture and Allied	0.695	3	5	1	409	3

Source: DRDA and Municipality Board of Nagaon, Morigaon and Hojai; Census of India, Assam Human Development Report

Table 11 Population compositions and poverty rate of the selected districts

District	Population				Poverty ratio (%)		
	Hindu (%)	Muslim (%)	Schedule caste	Schedule tribe	Total	Schedule caste	Schedule tribe
Nagaon	43.39	55.36	266,350	115,153	39.0	41.5	44.0
Marigaon	78.27	21.46	35,622	53,734	44.5	42.0	45.5
Hojai	59.24	40.52	39,055	5,147	NA	NA	NA

Source: Census of India, 2011 (<https://www.censusindia.co.in/district>) and Assam Human Development Report

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Author contributions

SM, conceived of the study, participated in data compilation its design and coordination, performed the statistical analyses, and drafted the manuscript. Finally, the author finalised the manuscript.

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Availability of data and materials

The study is based on primary data. The relevant data will be shared on demand only.

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Competing interests

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