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Catalysing change: unveiling the impact of livelihood training on entrepreneurial skills of women SHG members in Sikkim

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Abstract

Purpose – Our paper empirically evaluates the impact of livelihood training programmes on entrepreneurial skills of the women Self-Help Group (SHG) members.

Design/methodology/approach – The study is based on primary data collected from a sample of 416 SHG women of Sikkim, India, using a multi-stage cluster sampling. A multiple linear regression model is used to assess the impact of training participation on entrepreneurial skill. We correct for the potential self-selection bias associated with training participation using Propensity Score Matching (PSM) method and estimate the Average Treatment effect on the Treated (ATT) using 1:1 Nearest neighbour matching without replacement (caliper = 0.06) and full matching algorithm. The robustness of the result is validated using Rosenbaum bounds sensitivity analysis.

Findings – The findings suggest a significant and positive relation between livelihood training programme participation and entrepreneurial skills of the SHG members which relates to Human Capital Theory.

Originality/value – Our paper contributes to the existing literature by empirically evaluating the impact of livelihood training on entrepreneurial skills of the SHG members. Further, our study not only corrects the problem of self-selection bias associated with training participation but also studies the influence of unobserved confounders on the estimated results ensuring generalisability of the findings. Additionally, the study is conducted across all four districts of Sikkim, a north-eastern state of India which has received less academic attention in the context of SHGs and its activities.

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Paper type Research paper

1. Introduction

In India, over the past three decades, Self-Help Groups (SHG) have remained at the forefront of poverty alleviation policies launched by successive governments. Following (NABARD, 2002), SHGs are defined as saving based mutually cohesive collectives of individuals, mostly women, belonging to socio-economically disadvantaged backgrounds. The group members contribute a minimum mutually agreed fixed amount on a weekly or fortnightly basis to eventually build a corpus of funds out of which small amounts are lent to any of the member(s) in need. The rate of interest and terms and conditions tied to the loan are fixed in a democratic manner (Ghosh, 2012; Jain and Tripathy, 2011). The formation, functioning and stability of SHGs are driven by the ethos of trust, social solidarity and mutual support among its constituent members. SHGs in India find its roots in the successful Grameen Bank model of micro credit, the groundwork for which was laid by Professor Muhammad Yunus during the late 1970s in a small village—Jobra, Bangladesh.

In India, the fundamental goal of the SHG movement during the inceptive period was to promote financial inclusion by providing access to low-cost formal credit to the poor and marginalized sections who were chronically deprived of accessing formal banking services due

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to lack of collateral, overwhelming paperwork and high transaction costs (Dev, 2006; Holmstrom and Tirole, 1997). However, as time progressed the purview of the SHG initiative broadened to incorporate livelihood generation as a key objective. This shift in vision is reflected through the rollout of successive schemes such as the Swarna Jayanti Gram Swarozgar Yojana (SGSY), National Rural Livelihood Mission (NRLM), Deendayal Antyodaya Yojana–National Rural Livelihood Mission (DAY-NRLM) and North East Rural Livelihood Project (NERLP). These schemes, apart from extending the existing support (financial services), prioritized provision of skill-based training programmes tailored to the needs of socio-economically deprived rural women for advancing entrepreneurial skills and promoting entrepreneurship among them. With the continued proliferation of such capacity building livelihood training programmes and unwavering government support in favour of its widespread propagation, it becomes imperative to study its efficacy. Present study tries to examine the impact of livelihood trainings on the entrepreneurial skills of the SHG women.

The paper is organised as follows. Section 2 provides a comprehensive review on the existing literature, identifies appropriate research gaps and highlights the contribution of our study. Section 3 describes the sampling procedure and the source of data. Section 4 elaborates the conceptual framework and econometric methodology. Section 5 gives a precise description of the sample data. Section 6 discusses the regression results. Section 7 prescribes appropriate policies. Section 8 highlights the scope for future study, and section 9 concludes the study.

2. Literature review

2.1 SHG based impact assessment studies: understanding the trend

The launch of several SHG based initiatives attracted significant academic attention over the years and consequently a substantial number of impact assessment studies relating to various aspects of SHGs have emerged. A significant portion of the literature focuses on the role of SHGs in reducing the dependence of rural borrowers on informal moneylenders (Hoffmann *et al.*, 2021), consumption smoothing (Deininger and Liu, 2013), alleviating poverty (Ghosh, 2012; Maity and Sarania, 2017), augmenting income and employment (Banerjee and Ghosh, 2012; Panda, 2009) and thereby reducing economic vulnerability (Swain and Floro, 2012). Another set of studies have explored the role of SHGs on empowering women through improving their self-esteem, confidence, knowledge (Paramanandam and Packirisamy, 2015), autonomy regarding household decisions (Mohapatra and Sahoo, 2016), voting rights (Mahato and Jha, 2024), mobility (Banerjee and Ghosh, 2012) and household asset possession (Garikipati, 2008; Swain and Varghese, 2014). We even find studies tracing the impact of SHG participation on improvement of maternal health care (Saha *et al.*, 2013), and infant and child health care (Gugerty *et al.*, 2019). Apart from these studies which highlight the positive impact of the SHG initiative, there are several studies which show mixed results (Anil and Bal, 2021; Basumatary *et al.*, 2023; Sahu, 2015).

2.2 Studies on SHG based entrepreneurship and entrepreneurs

As the major theme of our study is to evaluate the impact of livelihood training on entrepreneurial skills of the women SHG members, understanding the research directions pertaining to the entrepreneurial aspects of SHG women is pivotal. The existing study in the domain have identified the drivers of starting a micro-enterprise (Kalyani and Chandralekha, 2002; Prasad and Choubey, 2024), studied role of SHG's micro-credit on micro-enterprise adoption among the SHG members (Dwivedi and Dwivedi, 2022), explored the nature and variety of microenterprises adopted (Hasalkar *et al.*, 2005; Prasad and Choubey, 2022), identified the factors which influence the enterprises' productivity (Jain and Tripathy, 2011; Kalyani and Chandralekha, 2002), examined personal characteristics and traits of a successful SHG entrepreneur (Jain and Tripathy, 2011), studied the impact of micro-enterprise uptake on entrepreneurs' living conditions, socio-economic status, empowerment (Paramanandam and Packirisamy, 2015; Pratibha *et al.*, 2021) and income and poverty of the entrepreneur's household (Pratibha *et al.*, 2021).

2.3 Livelihood training programmes and entrepreneurial skills

Despite a substantial number of academic discourses on the emancipatory role of SHGs, a key issue on SHG induced rural development relates to livelihood training programmes. So far, limited number of studies have examined its impact over parameters such as uptake micro-enterprises and its performance (Bharti, 2019), family income and household asset (Swain and Varghese, 2013, 2014) women empowerment (Banerjee and Ghosh, 2012), business performance (Karlan and Valdivia, 2011) and entrepreneurial skills (Banerjee and Borhade, 2016; Karlan and Valdivia, 2011; Sharma *et al.*, 2012). Among handful of studies investigating the impact of training on entrepreneurial skills of SHG members, Sharma *et al.* (2012) conducted a study in West Bengal, India using descriptive statistics, Karlan and Valdivia (2011) conducted a study in Peru using randomized controlled trials and Banerjee and Borhade (2016), studied a small sample of 155 SHG members from Pune, India. The findings of these studies show positive association between training and entrepreneurial skills.

Considering the literature backdrop, we identify the following research gaps and propose our contributions to fill it.

We find that number of studies investigating the impact of livelihood training on entrepreneurial skills of the women SHG members are limited, which necessitates further exploration. Present study is an attempt to fill this literature gap.

Next, we note that across the geographical spread of India, studies examining the impact of livelihood training has been conducted in Orissa, Andhra Pradesh, Tamil Nadu, Uttar Pradesh, Maharashtra (Bharti, 2019; Swain and Varghese, 2010, 2013, 2014), West Bengal (Banerjee and Ghosh, 2012; Sharma *et al.*, 2012) and Puducherry (Siddhartha *et al.*, 2019). However, Sikkim, one of the smallest north-eastern states (area = 7,096 sq km) of India lying in Eastern Himalayan Mountain region, has remained unexplored highlighting a geographical research gap. Sikkim— a home to socio-culturally different communities like Nepalis, Bhutias, Limboos, Sherpas and Lepchas— shares its boarders with Tibet, Bhutan and Nepal on three sides, and on fourth side, it connects with neighbouring state—West Bengal. Because of its rural mountainous terrain, harsh climatic conditions, poor road connectivity and comparatively few large-scale industries, indigenous micro-enterprises are crucial for sustainable and inclusive growth of Sikkim. Government has launched several SHG based programmes, with livelihood training as key objective, to promote micro-entrepreneurship in the state. However, because of its unique geographical and socio-cultural setting, the impact of training may vary as compared to other states of India. Thus, we contribute by conducting a training impact assessment in Sikkim to enables us to compare the results with other states of India and shape the policies.

Further, from methodological point of view, studies investigating the impact of training on entrepreneurial skill of SHG members in Indian context relies on small samples and have not addressed the problem of self-selection bias associated with training participation which limits the statistical validity of their findings. Present study contributes by studying a sample of 416 SHG members. Moreover, we eliminate the self-selection bias using propensity score matching method and ensures robustness of estimated result with the help of Rosenbaum bounds sensitivity analysis.

3. Methodology

3.1 Sample and data

The population for our study consists of all SHGs in Sikkim which are at least three years old. This benchmark criteria of retaining at least three-year-old SHGs has been arrived following Panda (2016), Sahu (2015) and Suprabha (2014). After a successful operation of three years, the SHGs are matured in terms of having: low attrition rate of its members, have accumulated a considerable amount of group corpus and its members having received considerable exposure to livelihood training programmes. As the distribution of SHGs across the four districts of the state is uneven, multi-stage cluster sampling was found to be most suitable for drawing a representative sample.

To begin with, we selected one block randomly from each of the four districts of the state. Next, we randomly chose one Gram Panchayat Unit (GPU) from each of the selected block. In the subsequent step, we select two villages randomly from each of the pre-selected GPUs resulting in a sample of eight villages. In the final step, all the matured SHGs from the selected villages were considered for our primary survey which resulted in selection of 40 SHGs. This method produced a sample size of 416 women members who had a record of having steady membership with their respective SHGs for three years or more.

4. Conceptual framework and econometric methodology

4.1 Livelihood training programmes and its relevance to Human Capital Theory

An adequate level of entrepreneurial skills and knowledge is a critical pre-requisite for effective operation of any entrepreneurial venture, and livelihood training programmes serves as an avenue to obtain and enhance such skills. According to Becker's Human Capital Theory, education and skill-based training programmes are necessary investments to enhance the skills and expertise of an individual which results in higher level of productivity and income (Becker, 1962). The SHG's livelihood training programmes portrays a strong practical relevance to Becker's theory wherein the SHG members are provided training on basic financial management, risk management, production, packaging, establishing forward and backward linkages, marketing and other skills related to a particular line of activity to enhance their entrepreneurial acumen.

Such training programmes are usually organized in the village community halls for ensuring easy access and a higher participation rate. The duration of these training programmes depends upon the nature of the enterprise/activity and usually varies from five to 15 days while few last up to a month. In some cases, providing training in the rural centre is not feasible because the activity involved requires a larger set up. Under such situations, the trainees are required to attend the training at an urban centre. The associated transportation and logistics expenditure is borne by the concerned SHG Promoting Institution (SHPI).

In Sikkim, during the period of our study, two programmes were found to be working towards development of SHGs and providing them livelihood training. These were NRLM—working in North and East Sikkim—and the World Bank sponsored NERLP in West and South Sikkim.

The officers of NRLM and NERLP usually conduct a meeting with the SHG members under their jurisdiction and invite their opinion as to the type of training most suited for the community. This makes training, essentially, a demand driven activity wherein the themes are crafted taking account of the interests, capabilities, existing resources and geographical advantage. Since Sikkim's diverse landscape, fertile land and conducive climate provide a huge scope for cultivating a wide variety of cereals, horticultural crops, floriculture and livestock; most of the trainings delivered to the SHG members tend to revolve around agriculture and allied activities. Our sample SHG members reported to have received training on animal husbandry: dairy, goatary, piggery and poultry; production of cash crops: mushrooms, ginger, turmeric, spicy chilies and organic farming; petty-manufacturing: broom binding, knitting, bakery, processing, packaging and marketing of turmeric, home-made pickle business, bottom-flower, bouquet, candle making, jute bag, bamboo handicraft, snacks etc. and other vocational trainings like operating a beauty parlour, business marketing and planning, public speaking and event management and anchoring etc. Apart from training, the SHGs are also provided additional incentives in the form of raw materials, hand-holding in setting up small manufacturing units and marketing assistance from the SHPIs.

4.2 Entrepreneurship skills and its measurement

Entrepreneurship is a multidimensional concept and has been defined in diverse ways based on different types of entrepreneurial skills necessary for running a business venture successfully.

The earliest academic discourse in the field of entrepreneurship is attributed to Richard Cantillon who defines an entrepreneur as an economic agent who undertakes risks and faces uncertainties to earn profit while buying and selling commodities (Cantillon, 1755). Jean-Baptise Say added to Cantillon's definition and suggested that, apart from having risk-taking ability under unpredictable circumstances, an entrepreneur must be innovative, should have the quality of a good organiser and manager with the skill to assemble different factors of production (land, labour and capital) and supervise the production process (Say, 1847). Again, around the 1920s Frank Knight, following Cantillon's definition, stressed on uncertainty. According to him an entrepreneur should be able to make business decisions in situations where outcomes are highly unpredictable (Knight, 1921). Penrose, around 1960 in her book "*The Theory of the Growth of the Firm*" came up with a list of characteristics of an entrepreneur which include self-assuredness, innovation, eagerness to find new resources for business and possessing efficient managerial skills leading to expansion of the business (Penrose, 1959). Later, Joseph Alois Schumpeter, who is considered a pioneer of modern thinking on entrepreneurship (Campbell and Wilson, 1975), added to Say's concept of entrepreneur's innovativeness. According to him, an entrepreneur should be innovative in terms of introducing new goods and services, implementing futuristic techniques of production, identifying new markets for sale of finished products, discovering additional avenues for procuring raw materials and should implement innovative business management strategies (Schumpeter, 1934). Harvey Leibenstein, around 1970, pointed out that an entrepreneur should be aware of obsolete ideas and technology and should be keen on replacing it with newer ones and thereby reduce the wastage of resources. In line with earlier proponents of entrepreneurship (Richard Cantillon, J.B. Say and Frank. H. Knight) Leibenstein also acknowledged the importance of decision making under uncertain situations as an attribute for a successful entrepreneur (Leibenstein, 1979). Israel Kirzner around 1975 defined an entrepreneur as an individual who is continuously studying the market trends in search of new opportunities for buying and selling resources which earn them profit (Kirzner, 1982). According to McClelland an entrepreneur should have self-awareness, should believe in their ideas and should have excellent persuasive power (McClelland, 1987). Similarly, contemporary studies in the domain also point out that an entrepreneur should have creative ideas and vision for future progress (Csikszentmihalyi, 1996; Locke, 2000), business management skills (Putta, 2014), interpersonal skills (Mattare, 2010), self-confidence (Chell and Tracey, 2005), passion (Boyd and Vozikis, 1994), persuasiveness (Jack and Anderson, 2002) and risk-taking ability (Miner and Raju, 2004). Among the extant literature in the domain of entrepreneurship we have followed the study by Lyons *et al.*, (2019, 2020) as these studies have undertaken a meticulous scrutiny of the available literature and have provided a list of thirty skills [1] grouped under four heads showcasing different aspects of entrepreneurship, specially under rural setup. The four heads are: "Business management skills," "Relationship management skills," "Organisational process management" and "Transformational management skills." As entrepreneurial skill is a qualitative variable, it cannot be measured in terms of abstract cardinal numbers. Thus, following recent studies (Lyons *et al.*, 2019, 2020; Oosterbeek *et al.*, 2010) we measure the thirty different constituents of entrepreneurship skills using five-point Likert scale [2].When asked: "how do you rate yourself in terms of the listed entrepreneurial skills?", our respondents rated themselves with the values 1 to 5, where 1 signifies very low, 2 denotes low, 3 signifies medium, 4 indicates high and finally, 5 corresponds to very high. Following Oosterbeek *et al.* (2010), we aggregate all the thirty ratings of each sample respondent by taking a simple arithmetic mean to obtain a single score termed as "entrepreneurial skills" which is a continuous variable ranging from 1 to 5.

4.3 Econometric methodology

With an objective to investigate the potential impact of livelihood training on formation of entrepreneurship skills—a continuous variable—we have employed multiple linear regression model which can be specified as:

$$Entrepreneurship\ skills = \alpha + \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \dots\dots\dots\dots\dots\dots + \beta_{14} X_{i11} + \mu_i$$

In the chosen model, out of all other regressors, we are mainly concerned about the binary variable which accounts for respondents' participation in livelihood training programme. A precise description of all the regressors employed in our model as well as the expected relationship of each with entrepreneurship skills is provided in Table 1.

5. Descriptive statistics

Table 2 presents descriptive statistics for our full sample data as well as its two categories of trained and untrained SHG members. Basic statistical tests like the chi-square test and independent sample *t*-test have been employed to evaluate the statistical significance of the observed differences between the parameters.

A major portion (64.18%) of our sample SHG members belong to the age bracket 31–50 years. It is quite noticeable that a higher proportion of SHG members who reported to have received training fall in the age group of 31–50 compared to their untrained peers. We

Table 1. List of independent variables and their expected relationship with entrepreneurship skills

Dependent variable: entrepreneurial skills

Variable	Description	Expected r elationship
Training status (X_1)	A binary variable denoting participation in a livelihood training programme. Training Status = 1, if the SHG member has attended any one of the training programmes; otherwise = 0	(+)
Respondent's age group (X_2)	A variable denoting respondents' age group. Age has been categorized into five levels: less than 30, 31–40, 41–50, 51–60 and above 60	(+)
Respondent's education (X_3)	The variable accounts for a respondent's educational attainment. It consists of six distinct categories: Illiterate, Primary, Middle, High school, Senior Secondary and graduate and above	(+)
Caste (X_4)	A categorical variable with three levels signifying caste of the respondent: General/Other Backward Castes (OBCs), Scheduled Castes (SC) and Scheduled Tribes (ST)	(+)
Ethnic group (X_5)	It is a categorical variable denoting the ethnic group of the respondent. It has five categories: Bhutia, Lepcha, Limboo, Nepali and Sherpa	(+)
Land ownership (X_6)	Whether the respondent's household owns ancestral land. If Yes = 1; otherwise = 0	(+/−)
No. of dependents (X_7)	It is a discrete variable representing the number of dependent members in a respondent's household. Besides accounting for the usual dependent members with age in the range of 0–14 years and those above 65, it also includes those household members who are unemployed, either temporarily or permanently	(+)
No. of earning members (X_8)	A discrete variable denoting the number of earning members in the respondent's household (excluding the respondent)	(+)
Family type (X_9)	It is a binary variable that takes into account the family type—joint or nuclear—of the respondent. It takes a value "1" if the respondent belongs to a joint family, otherwise it takes a value "0"	(+/−)
Occupation of household head(X_{10})	A binary variable which takes the value "1", if the household head operates an enterprise; otherwise, it takes a value "0"	(+)
District dummies (X_{11})	To account for spatial differences with respect to entrepreneurship skills we have used dummies to represent each of the four districts: East Sikkim, West Sikkim, North Sikkim and South Sikkim	(+)

Source(s): Authors' conceptualisation

Table 2. Descriptive statistics

Variables (1)	All (2)	Untrained (3)	Trained (4)	χ^2 (5)	*p*-value (6)
Age categories					
<30	74 (17.79)	41 (21.58)	33 (14.60)	18.258	0.001
31–40	158 (37.98)	70 (36.84)	88 (38.94)		
41–50	109 (26.20)	36 (18.95)	73 (32.30)		
51–60	54 (12.98)	27 (14.21)	27 (11.95)		
>61	21 (5.05)	16 (8.42)	5 (2.21)		
Education					
Illiterate (can do signature only)	54 (12.98)	38 (20.00)	16 (7.08)	22.708	0.000
Primary (I-V)	104 (25.00)	51 (26.84)	53 (23.45)		
Middle (VI-VII)	36 (8.65)	9 (4.74)	27 (11.95)		
High school (VIII-X)	159 (38.22)	66 (34.74)	93 (41.15)		
Senior secondary (XI-XII)	48 (11.54)	18 (9.47)	30 (13.27)		
College and above	15 (3.61)	8 (4.21)	7 (3.10)		
Caste					
General/OBC	295 (70.91)	129 (67.89)	166 (73.45)	1.882	0.390
SC	12 (2.88)	7 (3.68)	5 (2.21)		
ST	109 (26.20)	54 (28.42)	55 (24.34)		
Ethnic group					
Bhutia	33 (7.93)	20 (10.53)	13 (5.75)	4.356	0.360
Lepcha	18 (4.33)	9 (4.74)	9 (3.98)		
Limboo	13 (3.13)	7 (3.68)	6 (2.65)		
Nepali	338 (81.25)	149 (78.42)	189 (83.63)		
Sherpa	14 (3.37)	5 (2.63)	9 (3.98)		
Family type					
Nuclear	230 (55.29)	115 (60.53)	115 (50.88)	3.881	0.049
Joint	186 (44.71)	75 (39.47)	111 (49.12)		
Land ownership					
No	170 (40.87)	94 (49.47)	76 (33.63)	10.724	0.001
Yes	246 (59.13)	96 (50.53)	150 (66.37)		
Occupation of household head (if HH is an entrepreneur)					
No	293 (70.43)	150 (78.95)	143 (63.27)	12.176	0.000
Yes	123 (29.57)	40 (21.05)	83 (36.73)		
District					
East Sikkim	104 (25.00)	48 (25.26)	56 (24.78)	9.562	0.023
West Sikkim	93 (22.36)	33 (17.37)	60 (26.55)		
North Sikkim	83 (19.95)	34 (17.89)	49 (21.68)		
South Sikkim	136 (32.69)	75 (39.47)	61 (26.99)		

Continuous variables

	All		Untrained		Trained		*t*-stat	*p*-value
	Mean	SD	Mean	SD	Mean	SD		
No. of dependents	2.49	1.20	2.43	1.13	2.54	1.26	−0.961	0.337
No. of earning members	1.53	0.91	1.54	0.98	1.52	0.85	0.164	0.870
Entrepreneurial skill	2.61	1.03	2.16	0.81	3.00	1.03	−9.063	0.000

Note(s): Figures in parentheses denote the respective percentages
Source(s): Survey data

also note that the proportion of untrained members in the age categories of "*less than 30*", "51–60" and "*more than 60*" is higher compared to the trained members ($\chi^2 = 18.258$, $p = 0.001$). The observed outcome is quite plausible as SHG members below 30 years of age were found to be more inclined towards childcare while those above 50 were susceptible to health hazards and lacked motivation to venture into newer vocations.

Acquisition of newer skills, in general, is expected to improve with increase in the level of education. We find that almost 38% of our sample respondents have obtained formal education up to high school. However, a comparison of the trained and untrained members on educational attainment indicates that a higher proportion of the members who had completed education up to middle, high-school and senior secondary, were found to be trained. Conversely, a higher percentage of illiterate, those having primary education and those having education up to college and above were found to be untrained. This is because the members with low level of education usually derive their livelihood out of wage labour in agriculture and non-agricultural sectors; their chances of attending training becomes limited as it would require them forgo their wage earnings. Also, those having higher education—graduation and above—were found to be employed in the urban pockets and thereby were unable to spare time for attending the training programmes.

Our sample was found to incorporate SHG members from almost all major caste and ethnic groups. However, most of our sample respondents belonged to the General/OBC category and Nepali ethnicity. A similar pattern is observed among the trained members. This observation, however, is not robust as the corresponding test statistics are insignificant.

Around 55% of the SHG members were from nuclear families while the remaining 45% were from joint families. A comparative examination across the two categories shows that a higher share of SHG members from nuclear families were untrained while a higher share of their peers from joint families were trained ($\chi^2 = 3.881$, $p = 0.049$). This hints to a notion that unlike women from nuclear families, those from joint families perhaps receive more support from their household members who compensate for their absence while they are away for attending the training programmes.

Under rural settings, land ownership is a critical indicator of wealth. Out of the sample respondents who reported to own ancestral land, a significantly larger share was found to be trained. On the contrary, among those reporting no land ownership, a higher proportion of respondents were found to be untrained. Clearly, respondents opting for training were better off in terms of land ownership compared to those who reported to be untrained.

Having a household head who is engaged in an entrepreneurial venture is likely to endow an individual with requisite knowledge, skills, resources and attitude to start an enterprise. About 29.57% of the sample respondents reported that their household head is engaged in an enterprise. A higher proportion of SHG members who reported to have an entrepreneur household head were found to be trained ($\chi^2 = 12.176$, $p = 0.00$).

Of the four districts in the state, the share of trained SHG members was found to be higher in West Sikkim and North Sikkim. On the contrary, in East and South Sikkim the share of untrained members was higher compared to the trained ones.

The average number of dependents and earning members in a respondent's household was found to be 2.49 and 1.53 respectively. As the corresponding t-values turn out to be statistically insignificant any significant difference between the trained and untrained respondents on these two parameters can be safely ruled out.

Nonetheless, the difference in entrepreneurship skills among the two groups emerges to be statistically significant. Clearly, trained members reported to have higher entrepreneurship skills vis-a-vis the untrained ones.

6. Regression results

The results for the multiple linear regression model have been shown in Table 3. As expected, we find a statistically significant positive linkage between livelihood training participation and

Table 3. Impact of training on entrepreneurship skills (multiple linear regression)

Variables	Estimate	Std. error
(Intercept)	2.583***	0.247
Training (Yes = 1)	0.596***	0.063
Respondent's age group		
>60	(base)	
<30	−0.063	0.161
31–40	0.013	0.151
41–50	0.115	0.151
51–60	0.129	0.153
Respondent's education		
Graduation and above	(base)	
Illiterate	−0.005	0.191
Primary (I–V)	−0.251	0.172
Middle (VI–VII)	−0.173	0.185
High School (VIII–X)	−0.207	0.166
Senior-Secondary (XI–XII)	−0.326	0.179
Caste		
Gen/OBC (ref)	(base)	
SC	−0.217	0.176
ST	−0.079	0.115
Ethnic group		
Bhutia	(base)	
Lepcha	−0.244	0.176
Limboo	−0.292	0.202
Nepali	−0.363*	0.153
Sherpa	−0.252	0.193
No. of earning members	−0.108**	0.039
Family type (Joint = 1)	0.195*	0.080
No. of dependents	−0.107***	0.031
Land ownership (Yes = 1)	0.063	0.071
Occupation of household head (entrepreneur = 1)	1.516***	0.070
District		
East Sikkim	(base)	
West Sikkim	0.279**	0.094
North Sikkim	−0.137	0.108
South Sikkim	0.086	0.090
Diagnostics		
No. of obs	416	
Multiple *R*-squared	0.701	
Adjusted *R*-squared	0.682	
F-statistic	38.11***	

Note(s): ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$
Source(s): Authors estimate based on primary data using R version 4.1.2

entrepreneurship skills. Additionally, our estimated model reveals key relationships between other regressors—taken as control variables—with entrepreneurship skills. It is found that respondents from the *Nepali* community have statistically lower entrepreneurial skills compared to their peers from the *Bhutia* community.

Respondents belonging to joint families were found to have statistically higher entrepreneurship skills compared to their counterparts with nuclear families. Similarly, respondents whose household heads are entrepreneurs were found to have statistically higher entrepreneurship skills vis-a-vis their peers whose household heads are engaged in other professions. A higher number of both earning members and dependents in a respondent's household is found to be statistically associated with lower acquisition of entrepreneurial skills. Besides, a distinct spatial disparity in entrepreneurship skills is noted among the sample respondents. Respondents from West Sikkim are found to be faring better in terms of entrepreneurial skills as compared to the base category—*East Sikkim.*

It is worthwhile to note, however, that variables like respondent's age, education, caste and ownership of ancestral land are found to have no statistically significant relationship with entrepreneurship skills.

We refrain from a detailed discussion of the estimated model in Table 3 as our primary predictor—*participation into training*—happens to be a choice variable. In other words, the respondents self-selected themselves to participate in the livelihood training programmes. This self-selection leads to non-random sample selection, which gives rise to biased conclusions (Cameron and Trivedi, 2005; Heckman, 1979). Such selection bias can be adequately addressed using Propensity Score Matching (PSM) method (Guo and Fraser, 2014). Thus, we used the PSM approach and estimated the Average Treatment effect on the Treated (ATT) using 1:1 Nearest neighbour matching without replacement (caliper = 0.06) and full matching algorithm.

Table 4 presents the PSM estimates for evaluating the causal effect of training programme participation on entrepreneurship skills. The ATT shows that participation in livelihood training programmes has a significant and positive impact on entrepreneurship skills. However, robustness of this finding depends highly on its sensitivity to hidden biases or unobserved confounding (Guo and Fraser, 2014). In order to confirm its robustness, a sensitivity analysis is carried out following Rosenbaum bounds approach using the specification as (Guo and Fraser, 2014):

$$\frac{1}{\Gamma} \leq \frac{\frac{\pi_1}{1-\pi_1}}{\frac{\pi_0}{1-\pi_0}} \leq \Gamma$$

Given that $\Gamma \geq 1$ and both treatment and control group have the same covariates but do not have the same π.

π_i = Chances of getting treated, i = 0 for control and i = 1 for treated

The test results presented in Table 5 show different values of Gamma (Γ) which denote the odds of differential assignment to training programmes due to unobserved factors. It is clearly observed that our result becomes sensitive to unobservables at about $\Gamma = 2.4$. This implies that the unobserved confounder must increase the odds of treatment by more than 2.3 times for our finding to be refuted. Since having a confounder with such a substantial impact is not possible, our outcome showing the impact of training on entrepreneurship skills is insensitive. Therefore, the claim that participation in livelihood training programmes improves entrepreneurial skills is indeed acceptable.

Table 4. Estimates based on propensity score matching methods

Outcome variable: entrepreneurship skill
Explanatory variable: Participation of SHG member into livelihood training programme

Matching algorithms	Entrepreneurship skill ATT	S.E.	Observations
1:1 N N Caliper = 0.06	0.624***	0.122	234
Full matching	0.648***	0.091	416

Note(s): ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$
Source(s): Authors estimate based on primary data using R version 4.1.2

Table 5. Rosenbaum bounds- entrepreneurship skill

Wilcoxon signed rank test Γ	Lower bound	Upper bound
1	0	0.000
1.1	0	0.000
1.2	0	0.000
1.3	0	0.000
1.4	0	0.000
1.5	0	0.000
1.6	0	0.001
1.7	0	0.002
1.8	0	0.004
1.9	0	0.007
2	0	0.012
2.1	0	0.020
2.2	0	0.031
2.3	0	0.046
2.4	0	0.064
2.5	0	0.087

Note(s): Gamma is Odds of Differential Assignment to Treatment Due to Unobserved Factors
Source(s): Authors estimate based on primary data using R version 4.1.2

7. Policy implication

7.1 For policymakers

To replicate the observed positive impact of livelihood trainings on entrepreneurial skills of the SHG members, we suggest the policymakers to integrate such trainings as a key component of every SHG based programmes being launched.

7.2 For practitioners

To scale up the benefit of livelihood training programmes, we suggest the practitioners to encourage more and more SHG members to participate in it. Further, to ensure wider accessibility of these trainings, its frequency should be increased and online trainings should also be provided to reach the remote areas.

8. Limitation of the study

Despite the robust results leading meaningful insights, our study still has some limitation. We have used a cross-sectional dataset and propensity score matching method for an impact evaluation study which provides us insights about the sample at a specific point of time only. A more comprehensive way to study causal effects of training participation is to use a longitudinal dataset and employ the Difference-in-Difference method. It provides better insights about the same sample over multiple time periods. Thus, there exists scope for a longitudinal study in future.

9. Conclusion

Present study examined the impact of livelihood training programmes on entrepreneurial skills of women SHG members of Sikkim. Using a representative sample of 416 SHG members, collected through a multi-stage cluster sampling, we employed multiple linear regression model to test our hypothesis, appropriate propensity score matching method to eliminate the potential self-selection bias and Rosenbaum bounds sensitivity analysis to ensure robustness of the results against the unobservables. Our result shows that participation into livelihood training programmes enhances the entrepreneurial skills of the SHG members. This result is in line with the existing literature (Banerjee and Borhade, 2016; Karlan and Valdivia, 2011; Sharma *et al.*, 2012) and with Becker's Human Capital Theory.

Notes

1. The list of 30 entrepreneurship skills is: know-how about the field of endeavour, having sound understanding of legal rules, managing the financial record, procuring investment for the enterprise, ability to advertise and sell the product, competency in managing day to day business processes and ability to use technology for business enhancement grouped under the head "business management skills." Again, strength of connecting with people in the field of business, ability to use current partnership for mutual benefit, proper utilisation of resources, establishing and sustaining reputation, proficiency in building effective connections with community, ability to be responsible for the decisions and ability to team up with others for business purpose grouped under the head "relationship management skills." Further, ability to communicate properly, workflow management skill, swift and sound decision making, resolving clashes constructively, disciplined and productive conduct grouped under "organisational management process". Finally, troubleshooting ability, perseverance, enthusiasm and charisma, adaptable nature, ability learn and deploy knowledge, creative thinking, implementation of new ideas, leadership skills, ability to overcome setbacks, resourcefulness and self-realisation grouped under "transformational management skill"
2. Likert scale is basically a measure of attitudes designed to allow respondents to rate how strongly they agree or disagree with carefully constructed statements, ranging from very positive to very negative attitudes toward some object (Zikmund *et al.*, 2010).

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