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IMPACT OF TOURISM ENTREPRENEURSHIP ON THEIR SOCIO-ECONOMIC OUTCOMES: A PROPENSITY SCORE ANALYSIS

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Abstract

Tourism sector has proven to have been impacting the economic, social, cultural and environmental cycle of the people and places and that it is a subject-matter of contemporary interest. The study makes an attempt at mapping the impacts of entrepreneurship in tourism sector on their socio-economic outcomes. Quasi-experimental comparison methods namely propensity score matching (PSM) and difference-in-difference (DinD) were used in analysing the data. The results highlight the positive impacts of tourism on the entrepreneur's socio-economic outcomes and these are statistically significant. However, there is scope for better impact through an enabling tourism environment. This can be attained through a holistic sustainable framework of tourism development invested over a period of time.

Keywords: *Tourism-Related Entrepreneurship, Socio-Economic Outcomes, Propensity Score Matching, Difference-in-Difference*

INTRODUCTION

The tourism sector envelopes a diverse range of providers and consumers of a variety of goods and services (Coetzer, 2001/02). As such, the range and depth of economic activities under the umbrella of tourism has been in perennial existence and growing continously. However, the standardization and professionalization of the sector is relatively new *(as compared to other social sciences)* with the Online Etymology Dictionary stating that the word 'tourist' and 'tourism' first appeared in 1780 and 1811 respectively. Importantly, overtime tourism has grown considerably and encompassed direct and/or indirect effects on the development of various fronts such as economic, social, political, cultural, overall national development and international relations (Ashley, 2000; Brida, Carrera and Risso, 2008; Fayissa, Nsiah and Tadasse, 2007; Goodwin, 2006; Vellas, 2011; World Tourism Organisation, 1995; World Travel and Tourism Council [WTTC], 2006; WTTC, 2012; Zortuk, 2009).

Globally, tourism has experienced a continued and steady expansion and diversification in the last six decades. More economies have identified tourism as one of the economic engines for growth and development. As such, it has become one of the largest and high growth economic sectors (Othman and Rosli, 2011). The progress and sustenance in tourism vibrancy is predominantly an outcome of products and services provided by entrepreneurship through micro and small enterprises. The creation of national wealth and its dynamism depends upon the competitiveness of its firms which in turn relies fundamentally on the capabilities of its entrepreneurs (Cuervol, Ribeiro and Roig, 2008). Hence, entrepreneurship is a dynamic function and envelopes a plethora of managerial aspects (Busenitz, et al., 2003) which are ultimately aimed at value creation. Conversely, one form of such entrepreneurship as per classification of *'focus and operation'* is tourism-related entrepreneurship.

In relation to the above, all entrepreneurship focused upon tourism clientele with being market-positioned and running operations accordingly can be defined as tourism-related. This is a phenomenon flourished by economic, social and political conditions (Aghapour, et al., 2012). As such, persons and businesses that hawk goods or services such as arts and crafts to tourists are tourism-related entrepreneurs (Koh, 1996). In general, it has been identified as an essential actor for creating jobs and growing the economy (Taskov, et al., 2011). In most cases, tourism-related entrepreneurship manifest in the form of guide services, small spa and massage facilities, specialized bakery and pastry shops, coffee shops, souvenir and crafts shops, travel agencies, small tour operators, lodges, small hotels, restaurants, recreation businesses, bus companies and so forth (Sterren, 2008).

Significantly, the tourism sector is dominated by micro and small enterprises (Oldbell3, 2007). It comprises as the major form of tourism-related entrepreneurship especially in the context of developing countries, with India being no exception (Indian Institute of Tourism and Travel Management, 2010). Here, the MSME Development Act, 2006 provides for the definition of micro and small enterprise. In relation to tourism, the classification as accorded in the case of

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'enterprises engaged in providing or rendering of services' is more applicable. Hence, tourism-related entrepreneurship can be micro and small where the investment in equipment does not exceed ` 10 lakhs and is more than ` 10 lakhs but does not exceed ` 2 crores respectively.

Overall, tourism acts as a catalyst for entrepreneurial development (Ashley, Roe and Goodwin, 2001; Awang, Aziz and Samdin, 2012; Komppula, 2009; Othman and Rosli, 2011; Sheldon, 1993; UNESCAP, 2005; WTTC, 2006) in the form of micro and small enterprise (Awang, Aziz and Samdin, 2012; Liu and Var, 1986). It is estimated that 90 per cent of tourist accommodation establishments worldwide are represented by micro and small enterprise (Sheldon, 1993) with 95 per cent of total tourism businesses being in the form of micro enterprise (Middleton, 2001). As such, tourism-related entrepreneurship generate fees and tax revenues which are used to finance activities like health, education and stimulate the economy through investment in infrastructure (Surugiu, Frent and Surugiu, 2009). It contributes to raising productivity, dispersal of the economic power base through business ownership, creating employment, commercialising innovative products and creating new markets (Awang, Aziz and Samdin, 2012; Aziz, Awang and Samdin, 2012) and on sustainable practice the impacts are mainly seen in the socio-economic domains of the entrepreneurs amongst others (Kreag, 2001).

On the above backdrop, the passion to achieve positive outcomes is a strong driver for the birth of tourism-related entrepreneurship (Rola-Rubzen, et al., 2011). It provides employment, training, business skills and improves the socio-economic outcomes of family and community (Ashley, et al., 2007). They impact upon livelihood strategies through changes in employment and earnings, community recognition, increased pride and self confidence and reduced vulnerability through livelihood diversification (Jamieson, Goodwin and Edmunds, 2004; Tosun, 2002). It results in appreciation in financial assets for investment, regular wages and salary, profits from the enterprise and so forth (Ashley, 2000; Kim, 2002; Tosun, 2002; Um and Crompton, 1987). Overall, tourism-related entrepreneurship leads to increased socio-economic benefits (Mshenga and Owuor, 2009). As such, tourism-related entrepreneurship has a bearing on numerous facets of the entrepreneur's wellbeing; with the more prominent being in the socio-economic domain. Methodologically, the impact on entrepreneur's socio-economic outcomes is measured in terms of a quantitative score called 'difference-in-difference' (DinD) which is an intra and inter comparison between the experimental group (EG) and control group (CG) over a period of time.

Flowing from the above, the comparison between the EG and CG is done on the basis of propensity score matching (PSM) which is one of the components of propensity score analysis (PSA). PSA is a recent improvement in technique(s) applicable for impact evaluation in development studies consistent with better evaluation and derivation of more valid and reliable inferences. It is a contemporary impact evaluation technique which comprises of two components, namely, PSM and DinD. The propensity score as a concept first appeared in a publication by Rosenbaum and Rubin (1983) which described the estimation of causal effects from observational data.

Accordingly, the present study aims to evaluate the impact of tourism-related entrepreneurship on entrepreneur's socio-economic outcomes through the application of PSA by considering Meghalaya as a case. Meghalaya is situated in north-east India and covers a number of attractive tourism resources and attractions ranging from streams and rivers, hillocks and mountains, cultures and indigenous festivals and so forth. These are supplemented by a pleasant climate through most parts of the year. In particular, the tourism resources of Sohra (Cherrapunji) village and Mawlynnong village are a class apart.

PROPENSITY SCORE ANALYSIS METHODOLOGY FLOW

There are a number of technique(s) for tourism impact evaluation with the more prominent ones being tourism satellite account, multiplier effect, input-output analysis, computable general equilibrium, travel/tourism economic impact model and so forth. However, these are primarily macro impact evaluation designs. As such, a recent improvement in impact evaluation technique(s) at the micro/unit level in development studies as seen in Chemin (2006), Deininger and Liu (2009a), Deininger and Liu (2009b), Ghalib, Malki and Imai (2012), Islam (2009), Love (2003), Mangala and Chengappa (2008), Owuor (2009), Setboonsarng and Parpiev (2008) is PSA. It is a contemporary impact evaluation approach under the quasi-experimental research design with two techniques at the forefront, namely PSM and DinD. They represent a comparison between EG and CG on a systematic and sound scientific base. This is significant as the matching and comparison between the groups determines the acceptability of inferences. PSM assists in the derivation of a 'matched sample set'. The matched sample set represents EG and CG entrepreneurs with identical covariates. Accordingly, the *'impact'* of tourism-related entrepreneurship on entrepreneur's socio-economic outcomes is derived through DinD.

The study focuses on the impact of tourism-related entrepreneurship in Meghalaya, India during the period of five years from 2012 to 2017. The scope of the study is impact evaluative and inferential following an ex-post approach whereby pre and post quantitative data is collected from the respondents under a quasi-experimental research design. The entrepreneurs considered are those 'who are

entrepreneurs either in micro or small form for a period of at least five years'. The total sample size is 400 divided into 200 tourism-related entrepreneurs and is classified as the EG and 200 non-tourism-related entrepreneurs classified as the CG. They are collected through stratified random sampling on an optimum basis from all the districts of the state. Importantly, the EG entrepreneurs are randomly picked by narrowing down to tourism-related entrepreneurship located in and around the tourism resources and attractions or which are specifically involved in the provision of tourism-related services. The CG entrepreneurs are subsequently considered from around the same area.

Consistent with the nature of study, the variables holistically portray the socio-economic spectrum (Annexure I). The economic variables comprises of income, expenditure, savings, change in household assets, improved living standard, engagement in household economic decision-making, change in purchasing decision, contribution to household goals, access to cash borrowings, diversification of economic activities, job creation and improved access to markets (Ashley, 2000; Ashley, Roe and Goodwin, 2001; Flecha, et al., 2010; Jamieson, Goodwin and Edmunds, 2004; Tatoglu, et al., 2000; Wang, Li and Bai, 2005; Wang, Pfister and Morais, 2006). Similarly, the social variables comprises of change in access to learning, health and social amenities like potable water and electricity, freedom and capacity to travel, change in recognition and acceptance, strengthening of social networks, capacity building on facets of self-confidence and self-esteem; communication skills; team building skills and leadership skills, involvement in various development programmes and empowerment (Ashley, Roe and Goodwin, 2001; Jamieson, Goodwin and Edmunds, 2004; Tatoglu, et al., 2000; Wang, Li and Bai, 2005). The quantitative variables (CI, Rpm, Ppm, E_1, E_2 and E_3) are absolute measurements whereas the remaining variables (i.e. E_4 to S_{12}) are measured on an interval scale of 'one' to 'five' signifying 'no change', 'small change', 'visible change', 'extensive change' and 'enormous change' respectively.

In continuation, PSA initiates with the identification of covariates. The variables that have a certain statistical variation are used as covariates so as to derive a reasonably large matched sample set. In relation, several studies have adopted different tools for their identification. McCaffrey, Ridgeway and Morral (2004) used generalized boosted model, Eichler and Lechner (2002) standardized differences between the treatment and matched control groups and Hirano and Imbens (2001) developed a specific statistical criterion. Here, ANOVA is applied and the covariates considered are age, literacy level, number of children, enterprise type, enterprise nature, coded current investment, source of finance, people employed, coded revenue per month and coded profit per month. Importantly, the more the number of covariates, the smaller is the matched sample and vice versa. However, and statistically, the larger the number of covariates, the better it is. Hence, the variables ranging from one per cent to 25 per cent statistical level of significance are applied as covariates (highlighted in bold in Table 1). In particular, literacy level, enterprise type, coded revenue per month and coded profit per month is statistically highly significant. As such, 10 variables are used as covariates so as to match the two groups and to generate a valid and reliable matched sample set.

Table 1: ANOVA

Variable	F – Calculated Value	P – Value
Gender	0.27	0.60
Age	**2.50**	**0.11**
Literacy level	**26.77****	**0.00**
Marital status	0.08	0.78
Number of children	**5.86***	**0.02**
Family type	0.34	0.56
Enterprise type	**13.27****	**0.00**
Enterprise nature	**3.85**	**0.05**
Coded current investment	**1.30**	**0.25**
Source of finance	**2.41**	**0.12**
People employed	**1.46**	**0.23**
Coded revenue per month	**15.21****	**0.00**
Coded profit per month	**11.36****	**0.00**
Records kept of business activities	0.33	0.57

Two tailed table value @5%, @1% (df = 1, 398) = 5.06, 7.97 respectively
** significant at 1%, * significant at 5%

The covariates are used to derive the logit (z) values through the 'qualitative response regression models' under which the dependent variable is always qualitative and dichotomous in nature. Logit, Probit and Tobit are a few of such models. However, the more popular model 'logit' is applied in the analysis. Here, y (dependent) = 1/0, where '1' signifies the samples from the EG and '0' the samples from the CG and x (independent) = covariates (Chemin, 2006; Deininger and Liu, 2009a; Deininger and Liu, 2009b; Ghalib, Malki and Imai, 2012; Islam, 2009; Love, 2003; Mangala and Chengappa, 2008; Owuor, 2009; Setboonsarng and Parpiev, 2008) where x_1 is age, x_2 literacy level, x_3 number of children, x_4 enterprise type, x_5 enterprise nature, x_6 coded current investment, x_7 source of finance, x_8 people employed, x_9 coded revenue per month and x_{10} is coded profit per month. This provides the best platform for a valid and reliable estimation of 'z'. As such, y = f (x), provides running a logistic regression for n = 400 (1 = 200, 0 = 200) samples consequently deriving the coefficients of the covariates (Table 2).

Of the covariates, age, literacy level, coded current investment and coded revenue per month are statistically highly significant as depicted by Wald test and form an integral part of the model. In addition, the small standard error of the covariates reflects upon the large sample size applied in the model. Overall, the model is statistically highly significant as depicted by chi-square (x^2) at one per cent and degree of freedom = 10 [table value (two tailed) = 25.19] with a calculated value of 115.47. Subsequently, the value of 'z' is derived for the 'n' samples, where –

$$z = b_0+b_1x_1+b_2x_2+b_3x_3+b_4x_4+b_5x_5+b_6x_6+b_7x_7+b_8x_8+b_9x_9+b_{10}x_{10}$$

This derives the regression line as –

$$z = 1.23-0.53x_1-0.54x_2+0.32x_3+0.43x_4+0.25x_5+0.86x_6+0.17x_7-0.11x_8-0.46x_9-0.20x_{10}$$

Table 2: Logistic Regression Results

Covariate	Coefficient (b)	Wald Value	Standard Error
Age (x_1)	-0.53**	16.95	0.13
Literacy level (x_2)	-0.54**	15.88	0.13
Number of children (x_3)	0.32*	6.28	0.13
Enterprise type (x_4)	0.43	3.76	0.22
Enterprise nature (x_5)	0.25	1.32	0.22
Coded current investment (x_6)	0.86**	30.91	0.15
Source of finance (x_7)	0.17	0.26	0.32
People employed (x_8)	-0.11	0.41	0.17
Coded revenue per month (x_9)	-0.46**	9.54	0.15
Coded profit per month (x_{10})	-0.20	1.73	0.16
Constant (b_0)	1.23	3.42	0.67

** significant at 1%, * significant at 5%

Through the process 400 'z' values were estimated for all the samples that form the EG and CG. Statistically, the 'z' values vary from (-) ∞ to (+) ∞. This signifies that if 'z' is positive, with the increase in the value of the regressors, the odds that the regressand equals '1' increase and vice versa. The range of 'z' derived from the covariates under consideration is -2.18 to 3.98 in the EG and -5.00 to 2.27 in the CG. Subsequently, the 'logistic function' of 'z' is derived by the relation (inverse logit) $e^z/1+e^z$ where 'e' is the base of the natural logarithm with the constant value 2.718. This logistic function is the 'propensity score' and its value ranges from '0 to 1'. Further, the ln (log natural) (PS/1 - PS) equals 'z' (the logit). Thus, propensity scores are extracted for each of the 400 samples from the EG and CG with a score range of 0.10 to 0.98 and 0.01 to 0.91 respectively. Hence, the samples from the EG and CG having the same propensity score are identically balanced on the covariates and are therefore matched.

Importantly, different types of matching techniques exist such as Mahalanobis metric matching, nearest neighbor matching, nearest neighbor matching within a caliper, pair matching, variable matching and so forth. Here, the most appropriate and encompassing technique 'full-matching' is used whereby every sample of the EG is matched against every sample of the CG (Haviland, Nagin and Rosenbaum, 2007). On matching on the basis of propensity scores, 338 matched samples were established spread over 58 different scores. Notably, 15 samples in the EG and 21 samples in the CG with propensity scores ranging from 0.92 to 0.98 and 0.01 to 0.09 respectively are outliners i.e. they fall outside the matching range.

Through the matched sample set the impact of tourism-related entrepreneurship on entrepreneur's socio-economic outcomes is computed. This is specifically evaluated through a DinD score on the outcomes of the EG and CG symbolically represented as $(EG_1 – EG_0) – (CG_1 – CG_0)$ where 1 = current year and 0 = base year. Accordingly, the propensity score based average DinD is computed and arranged in ascending order (Dehejia and Wahba, 1999) for analysis. This converts the matched sample n = 338 into n = 58. Hence, PSA standardizes the 'n' samples into more meaningful and analytical form. Moreover, the DinD scores are statistically hypothetically tested through comparison of means by application of t – test at five per cent and one per cent (two tailed) df = 57 level of significance.

TOURISM-RELATED ENTREPRENEURSHIP AND ENTREPRENEUR'S SOCIO-ECONOMIC OUTCOMES

Table 3 portrays the entrepreneur's economic outcomes. In general, the DinD shows that the economic outcomes of the EG is greater than the CG. The tourism-related entrepreneurship has a positive impact on the outcomes, except in the case household economic decision making and ability to make purchase decisions. Overall, there is a positive change in the economic status of the entrepreneurs. The income, expenditure and savings are statistically significantly. The tourism-related entrepreneurship enabled the entrepreneur to derive direct benefits in the form of income and expenditure in the household. This expenditure is an important element in the scheme of outcomes as the ability to spend more is the hallmark that enables the entrepreneur to move forward and scale up in business and livelihood. In addition to the positive income and expenditure outcomes, the EG entrepreneurs

record a favorable and meaningful savings, despite being a small amount.

In relation to the other economic variables, most record positive DinD scores which are statistically significant (except for contribution to household goals) thereby highlighting better outcomes for the EG. In particular, the maximum score relates to access to markets and household assets/access to other credit sources with 0.39** and 0.34** respectively. However, the DinD score in case of household economic decision making and ability to make purchase decisions is greater in the CG. This may be on account of the continuous nature of business practices of such enterprises whereby they are not confined to seasonality of activity and 'peak and lean season'. The steady practice and flow of revenue across the year ensure continuity for decision making on such critical and routine affairs. This also highlights that the CG entrepreneurs also perform well and are exposed to relatively similar and in some case better impacts. Nonetheless and in general, the tourism-related entrepreneurship has a positive impact on the economic outcomes of the entrepreneurs. It provided a platform and enabled the entrepreneurs to start-up and scale-up their entrepreneurial endeavor.

Table 3: Entrepreneur's Economic Outcomes

PS	Variable	Difference-in-difference (D)	T value
0.49	DE_1 (₹)	2300.22**	3.54
	DE_2 (₹)	1689.59**	3.86
	DE_3 (₹)	610.63*	2.14
	DE_4	0.34**	3.67
	DE_5	0.29**	3.02
	DE_6	-0.03	-0.27
	DE_7	-0.05	-0.45
	DE_8	0.01	0.09
	DE_9	0.34**	3.05
	DE_{10}	0.18*	2.09
	DE_{11}	0.28*	2.25
	DE_{12}	0.39**	3.86

Two tailed table value at 5% (df = 57) = 2.00, ** significant at 1%, * significant at 5%

In continuation from the analysis of economic outcomes, Table 4 presents the entrepreneur's social outcomes. It records a positive DinD score across all the social variables. The EG experienced a better impact on the social continuum as compared to the CG. The tourism-related entrepreneurship has a positive impact on the outcomes and brought about a positive change in the social status of the entrepreneurs. In total, half the number of social variables (i.e. six) are statistically significant namely, access to learning, access to health services, access to social amenities, recognition and acceptance in community, self confidence and self esteem and communication skills thereby highlighting the generality and acceptability of the results. In particular, access to learning and access to social amenities records the maximum score with 0.28* and 0.27** respectively. On the other hand, the lowest social impact is seen in terms of team building skills and participation in development programmes with a low score of 0.09 and 0.07 respectively.

Table 4: Entrepreneur's Social Outcomes

PS	Variable	Difference-in-difference (D)	T value
0.49	DS_1	0.28*	2.63
	DS_2	0.23*	2.09
	DS_3	0.27**	2.95
	DS_4	0.14	1.35
	DS_5	0.26**	3.76
	DS_6	0.15	1.51
	DS_7	0.25**	2.94
	DS_8	0.23*	2.29
	DS_9	0.09	0.90
	DS_{10}	0.18	1.76
	DS_{11}	0.07	0.89
	DS_{12}	0.12	1.32

Two tailed table value at 5% (df = 57) = 2.00, ** significant at 1%, * significant at 5%

Overall, the tourism-related entrepreneurship has a favourable and meaningful impact on the social outcomes of the entrepreneurs. It provided a medium to the entrepreneurs to build upon their social standing and social capital through a holistic change over time. Overall, it instilled a sense of social assertiveness and social belonging through the positive impacts.

CONCLUSION AND FUTURE RESEARCH IMPLICATIONS

The application of PSA has enormously contributed to the dispensation on impact evaluation. At the outset, the current difference in investment shows that the EG involves a higher amount as it involves a lot of equipments and other items directly related to the service. However, the current difference in revenue per month is more in the CG depicting the continuous nature of such business practices and a steady flow of returns the year over. In general, the economic outcomes of the EG is greater than the CG. The tourism-related entrepreneurship brought about a positive

change in the status of the entrepreneurs. It provided a platform and enabled the entrepreneurs to start-up and scale-up on their entrepreneurial endeavor. The EG earned, spent and saved sufficiently more than the CG. It is similarly so with regards to most of the other economic variables which recorded positive DinD scores thereby highlighting better outcomes for tourism-related entrepreneurship. Similarly, the EG experienced a better impact on the social continuum as well. The tourism-related entrepreneurship brought about a positive change in the social status of the entrepreneurs. It provided a medium for building upon their social standing and social capital and instilled a sense of social assertiveness and social belonging.

In relation to future research implications, the current study does not dwell into the other myriad areas of entrepreneurship like market characteristics, sector dynamics, financial performance, liquidity and long-term solvency and so forth. Hence, a wider-ranging and in-depth study by combining the issues together can provide a more comprehensive picture on the overall status of tourism-related entrepreneurship and its impacts both at the macro and micro levels.

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ANNEXURE

Annexure I: Difference-in-difference Variable Code

The following refers to the 'd' in the economic (E) and social (S) variables of the EG and CG over the period of five years				**Difference-in-difference (D)**
Experimental Group (EG)		**Control Group (CG)**		
Code	**Variable**	**Code**	**Variable**	
EGE_1	Income per month in rupees	CGE_1	Income per month in rupees	$\mathbf{DE_1} = EGE_1 - CGE_1$
EGE_2	Contribution to household expenditure per month in rupees	CGE_2	Contribution to household expenditure per month in rupees	$\mathbf{DE_2} = EGE_2 - CGE_2$
EGE_3	Savings per month in rupees	CGE_3	Savings per month in rupees	$\mathbf{DE_3} = EGE_3 - CGE_3$
EGE_4	Household assets	CGE_4	Household assets	$\mathbf{DE_4} = EGE_4 - CGE_4$
EGE_5	Living standard	CGE_5	Living standard	$\mathbf{DE_5} = EGE_5 - CGE_5$
EGE_6	Household economic decision making	CGE_6	Household economic decision making	$\mathbf{DE_6} = EGE_6 - CGE_6$
EGE_7	Ability to make purchase decisions	CGE_7	Ability to make purchase decisions	$\mathbf{DE_7} = EGE_7 - CGE_7$
EGE_8	Contribution to household goals	CGE_8	Contribution to household goals	$\mathbf{DE_8} = EGE_8 - CGE_8$
EGE_9	Access to other credit sources	CGE_9	Access to other credit sources	$\mathbf{DE_9} = EGE_9 - CGE_9$
EGE_{10}	Diversification of economic activities	CGE_{10}	Diversification of economic activities	$\mathbf{DE_{10}} = EGE_{10} - CGE_{10}$
EGE_{11}	Job creation	CGE_{11}	Job creation	$\mathbf{DE_{11}} = EGE_{11} - CGE_{11}$
EGE_{12}	Access to markets	CGE_{12}	Access to markets	$\mathbf{DE_{12}} = EGE_{12} - CGE_{12}$
EGS_1	Access to learning	CGS_1	Access to learning	$\mathbf{DS_1} = EGS_1 - CGS_1$
EGS_2	Access to health services	CGS_2	Access to health services	$\mathbf{DS_2} = EGS_2 - CGS_2$
EGS_3	Access to social amenities	CGS_3	Access to social amenities	$\mathbf{DS_3} = EGS_3 - CGS_3$
EGS_4	Mobility and travel	CGS_4	Mobility and travel	$\mathbf{DS_4} = EGS_4 - CGS_4$
EGS_5	Recognition and acceptance in community	CGS_5	Recognition and acceptance in community	$\mathbf{DS_5} = EGS_5 - CGS_5$
EGS_6	Social networks	CGS_6	Social networks	$\mathbf{DS_6} = EGS_6 - CGS_6$
EGS_7	Self confidence and self esteem	CGS_7	Self confidence and self esteem	$\mathbf{DS_7} = EGS_7 - CGS_7$
EGS_8	Communication skills	CGS_8	Communication skills	$\mathbf{DS_8} = EGS_8 - CGS_8$
EGS_9	Team building skills	CGS_9	Team building skills	$\mathbf{DS_9} = EGS_9 - CGS_9$
EGS_{10}	Leadership skills	CGS_{10}	Leadership skills	$\mathbf{DS_{10}} = EGS_{10} - CGS_{10}$
EGS_{11}	Participation in development programmes	CGS_{11}	Participation in development programmes	$\mathbf{DS_{11}} = EGS_{11} - CGS_{11}$
EGS_{12}	Empowerment	CGS_{12}	Empowerment	$\mathbf{DS_{12}} = EGS_{12} - CGS_{12}$

d = Intra difference within the group over the period of five years
Difference-in-difference (D) = Inter difference between the EG and CG