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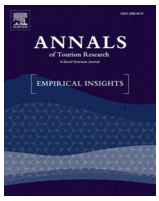

Wildlife tourism and local communities: Evidence from India

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ABSTRACT

This paper examines the impact of wildlife tourism on the livelihoods of local population around the Ranthambhore National Park in India which is popular for tiger sighting. A detailed household questionnaire elicited information on demographic details, income sources and consumption expenditure from 224 households. An empirical assessment of the economic impacts of tourism reveals that tourism development has failed to provide tangible benefits to the community. Qualitative assessment of community perception of tourism impacts and information from key informant interviews reveals contrasting ideologies of diverse stakeholders vis-à-vis park use. With tourism development benefitting mostly the big private (often non-native) players in the tourism industry, the residents feel alienated, and this doesn't augur well for conservation efforts.

1. Introduction

Economic development has over time become synonymous with higher rates of natural resource exploitation as well as environmental degradation, both of which have led to a significant loss of biodiversity. Most countries have responded to this actual and potential threat of biodiversity loss by demarcating certain areas as protected areas (PAs), such as national parks, natural reserves, and community conserved areas. According to the Convention of Biological Diversity, a PA is a "geographically defined area which is designated or regulated and managed to achieve specific conservation objectives", such as conservation of biological diversity, maintenance of natural processes across landscapes and sustainable use of biological resources within and around the PA. These objectives are to be pursued with the understanding that they also contribute to the wellbeing of the local community (Corson et al., 2014; Franks & Small, 2016). In a developing country like India, biodiversity conservation in PAs is inextricably linked with the livelihoods of millions of local people who derive direct and indirect benefits from them. The forest sector in India, for example, is seen as a major player in poverty alleviation programmes with more than 400 million people dependent on forests for their livelihood (MoEF, 2009). Conservation strategies thus become important in determining the contribution of maintenance of biodiversity and PAs to sustainable development and poverty alleviation.

As a major driver to conserve and maintain PAs, *tourism* has and must remain the major conversation in conservation (Leung, Anna, Glen, & Ralf, 2018). In most cases, from their very inception, PAs such as natural monuments (including landforms, seamounts, caves, and natural groves) and national parks are designed and developed for tourism, recreation, and visitor use. Sustainable tourism in PAs not only aims at conserving natural heritage and biodiversity but also respects the rights of the indigenous and local communities, ensures fair distribution of socio-economic benefits of tourism by providing stable employment and income generation opportunities for the local population and facilitates high-quality visitor experience (UNWTO and UNEP, 2005). Tourism value chains comprising of strategic private, public and community partnerships can "stimulate growth in local economies through backward and forward linkages" (Rao & Saksena, 2020), creating opportunities for the growth of tourism businesses, hospitality infrastructure and other private businesses. They offer alternative livelihoods for the local community residents including hotel jobs, guiding, traditional local crafts, transport etc. The strength of such local economic linkages depends upon the extent of local ownership of tourism assets and local participation in the management of tourism businesses.

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In this study, we examine the impacts of tourism on securing sustainable livelihoods for the local people living around the Ranthambore Tiger Reserve in India. This reserve represents the north-western end of the Bengal tiger's distribution range. It is home to the Royal Bengal tiger (*Panthera Tigris* subspecies), the largest living wild cat (Szokalski, Litchfield, & Foster, 2012) which belongs to the world's charismatic megafauna (Sankhala, 1977).[2] The reserve was declared a part of the Indian government's *Project Tiger,* which was initiated in 1973, and part of the reserve was declared as a national park in 1980, called the Ranthambore National Park (RNP). The reserve provides important ecosystem benefits including gene-pool protection, provision of water to neighbouring areas, provision of habitat and refugia for wildlife, carbon sequestration and cycling of nutrients, together valued at USD 129 million[3] in 2015 prices (Verma et al., 2015).

The Ranthambore tiger reserve is one of the most popular tiger reserves among wildlife enthusiasts, spread over an area of 656 mile^2 encompassing the RNP, three sanctuaries and some reserved forests (buffer zone). With a tiger population of 69 in 2018 (Jhala, Qureshi, & Nayak, 2020), it is the highest revenue earning tiger reserve in the country. Owing to the 'ease' of tiger sighting (Verma et al., 2019) and its proximity to the 'golden-triangle' of tourism route in northern India,[4] the park attracts nearly half a million tourists each year out of which one third are foreign tourists (Mathur, Nayak, & Ansari, 2019). It offers half-day and full-day safari options, across 10 designated zones in the forest, where tourists travel in open vehicles into the forest to explore the wildlife. The reserve has seen a tremendous increase in the number of tourists and a spur in the number of lodges and hotels in the vicinity of the park. These have added to the intense biotic pressure created by growing population densities in the villages around the park. A relatively small and patchy buffer zone along with a growing tiger population has resulted in increased anthropogenic pressures on the core tiger habitat, resulting in a poor prey base in many parts of the reserve. Cattle predation and crop damages by wild animals are common in villages around the park. Frequent human-wildlife conflicts have resulted in growing resentment of the local population towards conservation efforts.

It is imperative to include all stakeholders in the conservation of forests and wildlife resources, including the local community, whose active participation in conservation can yield effective results. Educating the local community to reinforce or rationalize attitudes (Singh, 2014; Woodroffe, Thirgood, & Rabinowitz, 2005) can go a long way in making them more pro-conservation. Also, establishing the link between greater tourism to the national park and new livelihood opportunities for the local community can help achieve greater local community support for conservation. There are empirical studies that find significant economic benefits derived by the host population from tourism (Chundawat, Raju, Rajora, & Matthews, 2018; Guha & Ghosh, 2007; Karanth, DeFries, Srivathsa, & Sankaraman, 2012). For instance, Karanth et al. (2012) find that nearly 65% of the tourists to India believed that the local people benefit from tourism to the parks. However, there is also ample evidence of gains from wildlife tourism being siphoned off by larger tourism establishments and the middlemen. The local population, with their limited economic resources and scant knowledge of the recreational industry, usually find it challenging to exploit park development and wildlife tourism to their advantage (Brown & Hall, 2000; Lacher & Nepal, 2010; Saarinen & Manwa, 2008).

This study examines the impact of tourism in the RNP on local livelihoods and their perceptions. More specifically, this study undertakes (i) an empirical assessment of the extent to which tourism participation augments livelihoods of participating households situated near the park; and (ii) an assessment of perceptions of the local community towards economic, social, and environmental impacts of tourism. This study adds to the existing literature on conservation and empirical work relating to the assessment of economic and non-economic impacts of tourism on the local community's welfare. It supplements the econometric findings with the analysis of the perceptions of the local population to identify the non-economic impacts of tourism. It contributes to the existing empirical approaches of statistically deducing the economic impacts of tourism by adopting the study-group versus the control-group model. Finally, the findings are summarized to highlight the sources of conflict between the main stakeholders in the tourism-conservation link.

The rest of the paper is organized as follows: section 2 elaborates upon the study area and data collection; section 3 outlines the objectives of this study in the form of research questions; section 4 outlines the methodology adopted in this mixed-methods study, followed by the presentation and discussion of the findings of empirical analyses in section 5; section 6 examines the perceptions of local community residents regarding the impacts of tourism on the local economy and the environment; section 7 summarizes the findings from key informant interviews about the sources of conflict between the local community residents and other stakeholders around the park; section 8 concludes.

2. Study area and data

The Ranthambore National Park (RNP), with a total area of 152 mile^2, is part of the most iconic tiger reserves in India, the Ranthambore tiger reserve. It is situated in the southeast part of the state of Rajasthan in India (see Fig. 1). For the most part, the habitat is a tropical, dry deciduous thorn forest. The biodiversity of the RNP includes not just the charismatic tiger, but also a large variety of reptiles, birds and mammals including the leopard, caracal, spotted deer, and the Indian Gazelle. The park is open for tourists from January to June and again from October to December. The period between October to April is the best time for tiger sighting. Most tourism-related activities are centred on the western side of the park, along the main Ranthambore road.

After being declared as a protected area in 1980, free grazing of livestock inside the RNP was no longer allowed. Stone quarrying and working at a cement factory which was located inside the park was also banned. The first round of relocation of the residents of 12 out of 17 villages situated inside the park took place in 1976, in line with the exclusionary principle of conservation (Dhakad, Madan, Dhar, Shukla, & Khandal, 2017). This led to the first major impact on the occupational structure of the displaced families. Subsistence agriculture rather than livestock rearing became the main livelihood source for the relocated households.

Currently, more than 300 villages lie within a 5-km radius of the park. Keeping in mind the main objective of this study, we focus on the impact of tourism on the livelihoods of households in a village situated on the left side of the park, which is where most of the tourism activities are concentrated. Direct livelihood impacts are determined by comparing income and expenditure pattern of tourism participating and non-participating households in the study village. To capture the indirect benefits of tourism that may accrue to the non-participating households in the study village, we compare the income and expenditure pattern of the non-participating households in the study village with that of a set of similar households situated in a control village, located on the right side of the park. The control village is chosen such that it has comparable geographical characteristics, climatic conditions, soil quality and socio-economic characteristics. For the study, *Sherpur* is chosen as our 'study village' (SV) and *Mei Kalan* as our 'control village' (CV). Agriculture is the main livelihood source in both villages. While both are equidistant from the park boundary (see Fig. 1), the SV is situated on the main Ranthambhore road that is more accessible for the tourists, and it is closer to the park entry gate that is used more often by the tourists. It also has a larger proportion of its population employed in the tourism industry. Since the two villages are on opposite sides of the park, there is no direct road connecting them (other than the

[2] With a dominant share in the global population of the big cats at the top of the food chain, India's thriving biodiversity consists of 70% of the global tiger population, 70% of Asiatic lions and more than 60% of the leopard population (Government of India press release posted on 11th Jan 2021; Accessed on 29th Jan 2021: https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1687688).

[3] Converted using the 2015 exchange rate of 1 USD = 64.1519 Indian Rupees, as per Reserve Bank of India's Handbook of Statistics on Indian Economy 2019–20 (available at https://www.rbi.org.in/Scripts/AnnualPublications.aspx?head=Handbook%20of%20Statistics%20on%20Indian%20Economy; accessed on 27th January 2021)

[4] India's golden triangle refers to the tourist circuit connecting 3 popular travel destinations (Delhi, Agra and Jaipur), the locations of which form a triangle on a map.

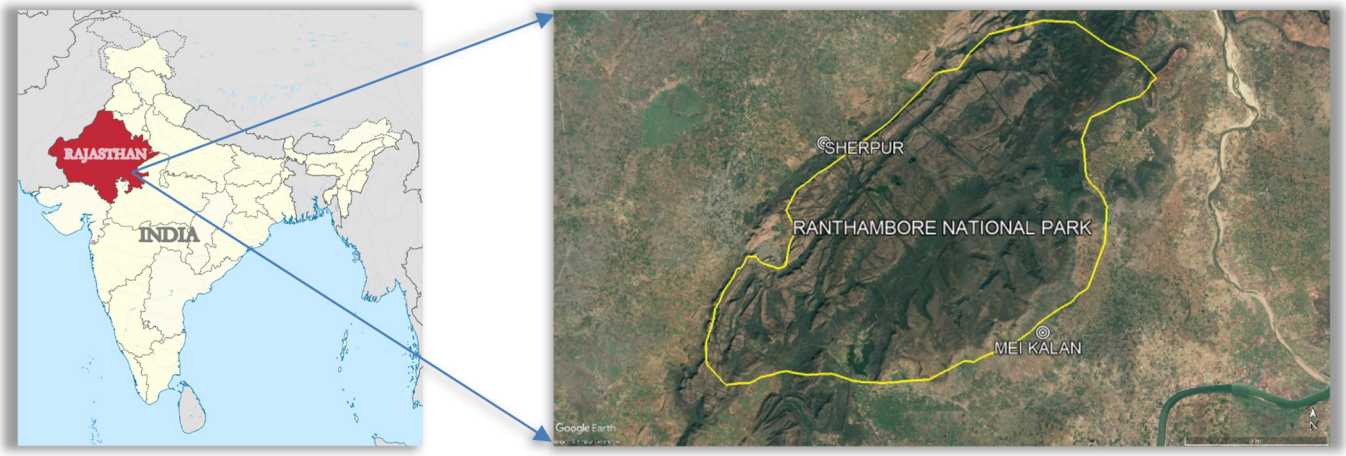

Fig. 1. Study area. Note: (i) State of Rajasthan highlighted in the map of India (left) has been downloaded from Google pictures, which is available for free use under commons (labelled for non-commercial reuse); (ii) Google Earth image of the Ranthambore National Park (right) area has the park demarcated in yellow and the locations of the study village (*Sherpur*) and the control village (*Mei Kalan*) have been pinned with circular markers. (iii) Both maps in the images are not true to scale. Source: https://commons.wikimedia.org/wiki/File:Rajasthan_in_India_(claims_hatched).svg for the map on the left; Google Earth for the image on the right, generated using Google Earth Pro ©2021 Google.

Table 1
Village level information from secondary sources.

	Study Village-*Sherpur*	Control Village- *Mei Kalan*
Area (square miles)	1.3	7.2
Population	1700	1928
No. of Households	307	396
Size of Household	5.54	4.87
Literacy Rate (%)	52%	54%
No. of females/1000 males	836	945
Forest Land (square mile)	0.29	4.42
Net Area Sown (square mile)	0.53	2.27

Source: Chandramouli & General, 2011.

one that goes all the way around the RNP) and hence there is very little economic interaction between them. It can be assumed that there is very little possibility of tourism money flowing from the SV into the CV through inter-village transactions. If one finds the welfare parameters of the two villages to be significantly different, the difference can be attributed to participation / non-participation in tourism. Table 1 presents a snapshot of village-level information compiled from the national population census.

To determine the extent of economic impacts of tourism participation on local livelihoods, a detailed household survey questionnaire was designed to collect information on the demographic profile of household members, household's sources of income and consumption expenditure pattern. 95 households from the SV and 129 households from the CV (accounting for approximately 30% of total households in both villages) were surveyed, selected via stratified random sampling. Within the SV, 42 households were identified as households that derived some (or all) of their income from tourism-related activities (SVp) while the remaining 53 were households with no income from tourism-related activities (SVn). Table 2 gives a distribution of the surveyed households based on the size of their landholding. Going by the Government of India's categorisation of farmers based on the size of the operational landholdings,[5] most farmers in the SV classify as either landless or marginal farmers. The average landholding size of households in the CV was much larger.

To investigate the local community residents' perception of the beneficial and adverse impacts of tourism, a separate module was added to the questionnaire with a series of Likert-type questions. This module was administered only to households in the SV to capture their perception of the impact of tourism on the local economy, the socio-cultural fabric, and the environment (specifically the national park and the wildlife).

Further, we interviewed diverse stakeholders to gain a deeper understanding of the contrasting ideologies related to park use and conservation. Five key informant interviews were conducted with community heads and local experts who have first-hand information about the local community. The qualitative findings from such interviews supplement our understanding of the prevailing community perceptions of tourism impacts. Data collection was carried out during the peak tourism month of March of 2017.

3. Research questions

A household's livelihood depends on its capabilities, assets, and activities, which are further dependent on its access to different types of livelihood capital. These include physical, natural, human, financial and social capital. Physical capital comprises (i) private capital of a household including household's physical assets in possession, cultivable land, livestock, and dwelling; and (ii) public capital in the form of village-level infrastructure such as roads, schools, hospitals etc. In villages around the RNP, village resources and basic infrastructure are grossly inadequate. To add to this, stricter conservation norms implemented in the park have further reduced a household's access to natural capital comprising of the forest and its resources. Financial capital comprises income from various sources, including government transfers. Tourism-related income can enhance the financial capital base of households by acting as an important supplement to a household's total income from other sources. Additional income from tourism can fund children's education and medical expenditures and thereby

Table 2
Distribution of surveyed households based on the size of landholdings.

Size of Landholding (in hectare*)	Number of households in SV	Number of households in CV
Zero	41	18
0 < size <0.76	33	14
0.76 < size <2.02	14	51
size >2.02	7	46
Total number of surveyed households	95	129

Note: *The unit of measurement of landholding size used in the villages is 'bigha'. The conversion factor used is: 1.6 bigha = 1 acre and 2.47 acres = 1 ha.

[5] https://pib.gov.in/Pressreleaseshare.aspx?PRID=1562687; accessed on 7th April 2021.

enhance the human capital base of households. A more educated and productive population is likely to be more pro-conservation and receptive towards the likely enrichment of the social networks of relationships between tourists and the local population, thus adding to both natural and social capital. Tourism income thus impacts a household's livelihood capital base in many ways and the underlying dynamics are complex. Drawing from the methodology adopted by Guha and Ghosh (2007), who suggest a deeper analysis of the expenditure pattern of households that derive tourism income vis-à-vis those which do not, this study distinguishes between tourism participating and non-participating households in the SV and compares their income and expenditure pattern.

The first research question that this study tries to answer is: Does tourism participation augment the livelihoods of participating households? Households with members engaged in tourism-related jobs (including wage employment or self-employment in the tourism sector) derive direct benefits from the additional tourism income. These direct effects are empirically assessed by comparing the livelihood status of tourism participating and non-participating households in the study village, where the livelihood status of a household is captured through its monthly income and consumption expenditure pattern.

Since the main indicators of livelihood status or household welfare used in this study are income and consumption expenditure pattern, the questionnaire for the household survey was designed to elicit detailed information on:

(i) Occupation of all the working members of a household along with their monthly incomes from all sources (actual and imputed), which were further distinguished between-

- income from agriculture (crop farming and livestock),
- income from non-agriculture (including sources of income other than agriculture such as petty business, employment in government and private enterprises etc.) and
- income from the tourism sector.

We use (a) per capita income and (b) household income as income-based indicators of household welfare and the objective is to verify if these income-based welfare indicators are systematically affected by participation in tourism-related activities.

(ii) The pattern of expenditure of the household, broadly classified as expenditure on 'food', 'education and medical needs' and 'non-food' (which includes residual expenditure on items such as travel, utilities, clothing, footwear, wages paid, religious and social expenses etc.) was also obtained. We use four expenditure-based welfare indicators, and the objective is to verify the presence of any systematic direct impact of tourism participation on these expenditure indicators.

The above two objectives account for the direct impacts of tourism participation on household livelihood and welfare (i.e., a comparison of monthly income and expenditure of households in SVp and SVn). However, some of the income generated from tourism is likely to trickle down to other parts of the village through intra-village exchanges. Several empirical studies confirm the presence of such secondary local benefits arising from significant 'leakage' of tourism money to communities living close to the tourism spots (Chundawat et al., 2018). Thus, total benefits from tourism income will include the direct benefits to the tourism participating households, as well as indirect benefits to non-participating households through the trickledown effect (Buchsbaum, 2004; Koens, Dieperink, & Miranda, 2009; Kumar & Rao, 2016). In this study, we attempt to capture these indirect tourism benefits by comparing the income and expenditure-based welfare indicators of non-tourism participating households in the SV with those of households in the CV (i.e., SVn versus CV). Any significant difference can be attributed to the leakage of tourism income to the non-participating households in the SV.

Post examining the material wellbeing from tourism participation, we try and assess the extent of subjective wellbeing from the perspective of the local residents. Community perception of the benefits vis-à-vis costs of wildlife tourism is crucial in fostering more pro-conservation and pro-park local attitudes. Hence, the second research question that this study tries to answer is: How do the local residents perceive the overall socio-economic and environmental impacts of tourism? Further, we substantiate our findings with information gathered through key informant interviews with community heads and local experts including the village heads, government officials, NGO heads and hotel management staff.

4. Methodology

A simple analysis of the difference in means is carried out across households in the SV and CV for important measures of physical and human capital as well as income and expenditure patterns. Regression analysis is carried out to further isolate the possible impact of participation in the tourism sector on per capita income and expenditure patterns of households while controlling for other confounding factors such as the size of household's landholding, livestock, household size, literacy rate and employment in non-agriculture activities. Two separate equations are estimated for the monthly income of a household from all sources, i.e., (i) monthly per capita income and (ii) monthly household income. Four separate equations for per capita expenditure are estimated, one each for (i) total monthly per capita expenditure, (ii) monthly per capita expenditure on food, (iii) monthly per capita expenditure on non-food items and (iv) monthly per capita expenditure on education and medical needs. In all equations, dummy variables are introduced for tourism participating household and study village households. Refer to Table A1 in the appendix for a detailed description and definition of each indicator and variable used in the regression analysis.

The equations for the 3 components of total expenditure (food, non-food and education-cum-medical) are likely to be characterized by contemporaneous correlation in the error terms and appropriate tests are carried out to take care of such a possibility. The regression equations are estimated with pooled data on both villages. All required diagnostic tests for coefficients and residuals are carried out to ascertain the robustness of the estimates. Data are analysed using EViews version 9.

To investigate the local population's perception of the impacts of tourism (beneficial/adverse), a separate module of the questionnaire is used to specifically elicit responses from each household in the SV to a series of questions. Each question has five Likert-type response options, ranging from strongly disagree (with a score = 1) to strongly agree (with a score = 5) categories, to capture the qualitative aspects of the impact of tourism on the local economy, culture, and environment. The response categories are based on an ordinal scale and the scores assigned to each category indicate the order, expressing a 'greater than' relationship, without implying any magnitude of difference. Since the Likert questions in the questionnaire are unique and stand-alone (with no intention of combining the responses into a composite scale), we analyse them as Likert-type items for which the appropriate statistical tools include modes, medians, and frequencies (Boone & Boone, 2012).

5. Empirical results

5.1. Preliminary results: Occupational structure, income distribution and expenditure pattern

In this sub-section, preliminary results are discussed based on (i) the descriptive statistics of the surveyed population presented in Table 3, and (ii) the test results of differences in means of important household-level variables presented in Table 4.

The working population in the surveyed villages is primarily engaged in (i) agriculture and allied activities including raising of livestock and (ii) non-agriculture activities including those engaged as casual labourers, those in petty businesses and those employed in government and private enterprises. The residents of the SV are also engaged in the tourism sector. The tourism participating households in the study village are those which have at least one household member employed in the tourism sector. Employment in the tourism sector comprises working as tourist guides,

Table 3
Descriptive statistics.

	Adult Literacy rate (%)	Number of members in the household	Size of landholding (hectares)	Per capita total income (Rs. Per month)	Per capita income from agriculture (Rs. Per month)	Per capita income from non-agriculture (Rs. Per month)	Per capita total expenditure (Rs. Per month)	Per capita expenditure on food (Rs. Per month)	Per capita expenditure on non-food (Rs. Per month)
Mean	59	6	1.52	6163	4609	1214	2434	742	797
Median	57	6	0.759	4450	2833	667	1873	625	667
Maximum	167	15	25.3	53,083	53,083	14,167	13,833	5000	4631
Minimum	0	1	0	300	0	0	250	63	1
Std. Dev.	30.6	2.7	10.3	6280	6404	1862	1848	492	662
Skewness	−0.1	0.7	5.1	3.7	3.8	3.35	2.5	3.9	2.8
Kurtosis	2.9	3.3	38.7	22.4	23.5	18.7	12.0	29.2	14.1

(Number of Observations $n = 224$)

Table 4
Testing for equality of mean values across villages.

	Variable	Average for a tourism participating household in the study village (SVp)	Average for a non-tourism participating household in the study village (SVn)	Average for a household in the study village (SVp + SVn)	Average for a household in the control village (CV)	|t-stat| for Difference in Means of	
						SVp versus SVn	SV versus CV
Household Characteristics	Adult literacy rate	57.5	55.1	56.2	60.3	0.37	0.99
	Household size	6.9	6.8	6.8	5.5	0.22	3.67[c]
	Per capita land size	0.254	0.366	0.317	1.704	1.02	6.16[c]
	Proportion employed in Non-Agriculture	42	65	55	28	2.99[c]	5.20[c]
Income Sources	Per capita income from Agriculture	1427	2304	1917	6592	1.77[a]	5.78[c]
	Per capita income from Non-Agriculture	931	1557	1280	1165	2.22[b]	0.46
	Per capita income	4166	3860	3996	7759	0.51	4.63[c]
Expenditure	Per capita expenditure on food	832	702	759	730	1.13	0.44
	Per capita expenditure on non-food	928	763	836	769	1.16	0.75
	Per capita expenditure on education & medical needs	622	754	696	1040	0.59	1.07[a]
	Per capita expenditure	2382	2219	2291	2539	0.52	0.99

[a] Implies significance at 10%.
[b] Implies significance at 5%.
[c] Implies significance at 1%.

safari-vehicle drivers, security personnel in the national park and those engaged in other tourism-related activities such as hospitality and sale of local crafts.

In our sample, the tourism participating households have a more diversified occupational distribution across agriculture and non-agriculture activities, with the tourism sector being the largest employer. Occupational distribution of the non-tourism participating households in the study village (SVn) and households in the control village (CV) are more skewed towards agriculture. Among those employed in non-agriculture activities, the majority work as casual labourers (see Fig. 2).

Testing the significance of the difference in average household level parameters provides useful insights (see Table 4). As compared to an average household in the SV, a household in the CV is found to have (i) a smaller household size, (ii) higher landholding size, (iii) a lower proportion of the working population employed in the non-agriculture sector and (iv) higher per capita income from agriculture, each found to be statistically significant at 1% level of significance. With a much larger size of per capita landholding and predominance of agriculture, an average household in the CV has a per capita income that is nearly twice that of an average household in the SV. This significant difference in per capita income however does not translate into a significant difference in per capita expenditure across households in the SV and CV. This is because the households in the CV save more and this was confirmed through face-to-face interviews.

Within the SV, the tourism participating households are found to have (i) a statistically lower proportion of their working population engaged in non-agriculture activities and (ii) relatively lower income from both agriculture and non-agriculture activities (significant at 10% and 5% respectively), as compared to the non-tourism participating households. This significant difference in income from agriculture and non-agriculture is, however, more than made up by income from tourism, such that total per capita income (which also includes tourism) for an average tourism participating household turns out to be higher than that of a non-participating household. This indicates the possibility of potential direct income benefits from tourism for the participating households, although the difference in average incomes is not found to be statistically significant. In our sample, households in SVp derive income from tourism-related activities which,

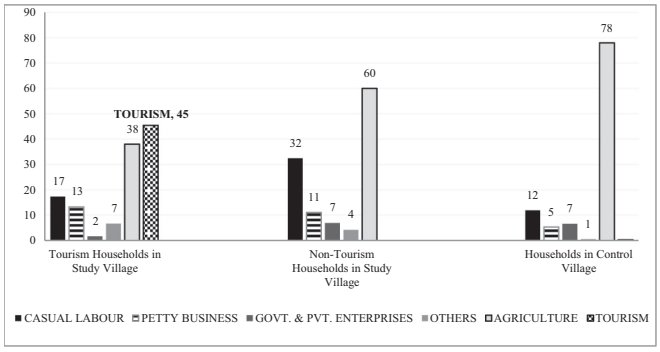

Fig. 2. Occupational distribution of earning population across non-agriculture activities and tourism (%). Note: The sum of occupational distribution across different activities adds to more than 100% because of the presence of individuals who are employed in more than one activity.

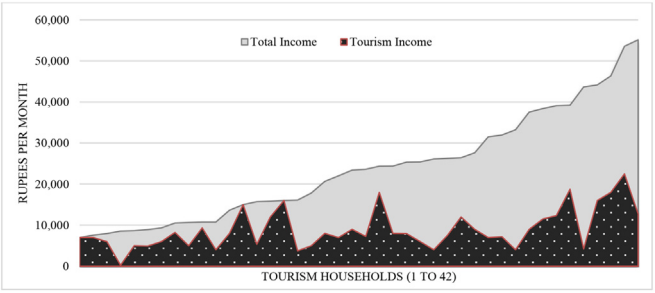

Fig. 3. Distribution of Total income and Tourism income of the tourism participating households in the study village. Note: 42 tourism participating households in the SV, arranged in ascending order of their total monthly income are depicted in the figure along with their monthly income from tourism activities.

on average, accounts for 45% of their total income. See Fig. 3 showing the distribution of total income and tourism income of each tourism participating household in the study village. As far as expenditure pattern is concerned, no significant difference is observed across households in the study village.

Thus, based on a simple test of differences in average per capita expenditure pattern, one cannot ascertain if tourism income results in any benefits to the participating households in the form of significantly higher consumption expenditure. A more rigorous regression-based analysis is carried out to assess the differential impact of tourism participation on household welfare.

5.2. Econometric results

In this sub-section, the results of the econometric analyses to ascertain the differential impact of tourism on household welfare in terms of monthly income and per capita monthly expenditure are discussed. Results are based on pooled data for SV and CV. Monthly income and per capita expenditure are regressed on a set of household-level variables capturing a household's demographic composition as well as ownership of physical and human capital. Dummy variables for tourism participation (yes/no) and village (study/control) are also introduced.

Regression equations of the monthly income equations are estimated using ordinary least squares (OLS) with robust standard errors and the results are reported in Table 5. Regression equations are estimated for 2 measures of monthly income: (i) monthly per capita income and (ii) monthly household income. As expected, the per-capita size of a household's landholding is found to have a significant positive impact on both measures of monthly income. Given the fact that the average size of a household's landholding is a meagre 1.52 ha, marginal returns to land size are expected to be significant.

Table 5
Regression results of monthly income equations.

Dependent Variable →	Log (per capita income)		Log (household income)	
Regressors ↓	Coeff.	Std. Error	Coeff.	Std. Error
Household Adult literacy rate	0.001	0.001	−0.001	0.001
Per capita size of landholding	0.213	0.024***	0.213	0.024***
Dummy for households with livestock	0.450	0.089***	0.544	0.090***
Household size	−0.044	0.024*	0.141	0.024***
Dummy for large households (members >6)	−0.114	0.130	−0.231	0.131*
Non-Agriculture Employment (%)	−0.002	0.001**	−0.002	0.001*
Dummy for Tourism participating household	0.064	0.117	0.001	0.118
Dummy for a study village household	−0.114	0.100	−0.062	0.101
Constant	8.213	0.154	8.751	0.156
Number of observations	224		224	
R-squared	0.537		0.569	
Adjusted R-squared	0.519		0.553	
F-statistic	31.1		35.4	
Prob(F-statistic)	0.000		0.000	

Notes: (i) * implies significance at 10%, ** implies significance at 5% and *** implies significance at 1%. (ii) The Variance Inflation Factor (VIF) scores were less than 10.

The size of a household and ownership of livestock are found to have a significant positive impact on both measures of monthly income. Together with the size of landholding, they represent a household's ownership of physical and human capital which determines its income-earning capacity. The dummy variable for large households with more than 6 members has a negative coefficient, significant only at 10% for the household monthly income equation.

The proportion of the working adults employed in the non-agriculture sector is also found to be significant at 5 and 10% for its negative impact on per capita income and total household income respectively. The non-agriculture employment options including casual labour-employment and other petty businesses are not as remunerative as agriculture and hence households with a greater proportion of their working members employed in non-agriculture activities, are found to have lower monthly incomes.

Interestingly, the results present no evidence of any significant direct impact of participation in tourism-related activities on per capita incomes or household income in the SV. The coefficient of the dummy variable for tourism participation (=1 for participating households in the SV) has the correct sign but it is found to be insignificant in both regression equations. Similarly, the dummy variable for study village households (= 1 for the SV) has a negative but insignificant coefficient for both equations. The magnitude of this coefficient captures the indirect impact of tourism on monthly incomes of non-tourism participating households (through the trickle-down process) as compared to the households in the control village. Thus, there is no evidence of a significant 'indirect' effect of tourism on incomes of the non-participating households in the SV.

The study also estimates four separate expenditure equations: total monthly per capita expenditure, and one each for its components: monthly per capita expenditure on food, non-food items and education-cum-medical needs. The equation for total monthly per capita expenditure is estimated using OLS. The equations for the 3 components of total per capita expenditure are estimated both by OLS as well as a system of Seemingly Unrelated Regression (SUR) given the possibility of the presence of correlation between the error terms. However, the error terms did not depict a significant correlation and hence only the OLS results are reported in Table 6. OLS estimates of only the first three equations are presented since the included independent variables in the regression analysis did not explain much of the variation in per capita expenditure on education-cum-medical needs.

The adult literacy rate is found to have a significant and positive impact on per capita expenditure on non-food items. As expected, the total per capita income is significant in all expenditure equations. The income elasticity of total per capita expenditure is 0.204, while it is much higher (= 0.419) for per capita expenditure on non-food items.

Per capita land size again has a positive and significant impact on a household's welfare in terms of higher per capita expenditure, particularly on non-food items. An increase in the size of the landholding by 1 bigha (= 0.253 ha) increases per capita expenditure by 6% and per capita expenditure on non-food items by nearly 10%. However, the impact of this variable on per capita expenditure on food is found to be insignificant.

Once again, the variable of our main interest, i.e., the dummy for tourism participation (=1 for participating households in the SV) is found to be insignificant across all expenditure equations. Hence, we find no evidence of a significant direct impact of participation in tourism on tourism participating household's welfare, captured here in terms of its expenditure pattern.

The coefficient of the dummy variable for study village households is positive and significant only in the equation for per capita non-food expenditure, implying a significantly higher expenditure on non-food items by the non-tourism participating households in the SV vis-à-vis those in the CV. Thus, there is evidence of indirect benefits from tourism accruing to the non-participating households in the SV. The trickle-down of tourism

Table 6
Regression results of monthly per capita expenditure equations.

Dependent Variable →	Log (per capita expenditure)		Log (per capita expenditure on food)		Log (per capita expenditure on non-food)	
Regressors ↓	Coeff	Std. Error	Coeff	Std. Error	Coeff	Std. Error
Household Adult literacy rate	0.002	0.001	−0.001	0.001	0.004	0.002***
Log of per capita income	0.204	0.077***	0.171	0.064***	0.419	0.214**
Per capita income from all sources other than agriculture	0.000	0.00002***	0.000	0.00002***	0.000	0.000
Per capita size of landholding	0.060	0.030**	−0.013	0.025	0.097	0.042**
Dummy for households with livestock	0.120	0.100	−0.075	0.084	0.109	0.131
Household size	0.014	0.024	−0.065	0.020***	−0.012	0.036
Dummy for large households (members >6)	−0.202	0.133	0.049	0.111	−0.113	0.158
Dummy for Tourism participating household	−0.044	0.118	−0.037	0.099	0.170	0.135
Dummy for a study village household	0.150	0.099	0.121	0.083	0.451	0.144***
Constant	5.456	0.629	5.373	0.525	1.958	1.873
Number of observations	224		224		224	
R-squared	0.251		0.276		0.353	
Adjusted R-squared	0.220		0.245		0.325	
F-statistic	7.97		9.06		17.83	
Prob(F-statistic)	0.000		0.000		0.000	

Notes: (i) * implies significance at 10%, ** implies significance at 5% and *** implies significance at 1%. (ii) The Variance Inflation Factor (VIF) scores were less than 10. (iii) The log(per capita expenditure on non-food) equation depicted heteroskedasticity (Breusch-Pagan-Godfrey test based F-statistic = 2.415 with Prob. F(9,214) = 0.013). Hence, White heteroskedasticity-consistent standard errors are reported for this equation. For this equation, the F-statistic figure corresponds to (heteroskedasticity-robust) Wald-F statistic.

income to these households gives them additional purchasing power which is likely to be spent on the relatively more income elastic non-food items. Thus, the regression analyses help us establish the presence of only indirect benefits of tourism participation. We find no evidence of significant direct benefits from tourism participation in the form of higher monthly incomes or expenditure.

6. An investigation of the local residents' perception of impacts of tourism

To assess the local population's perception of the impacts of tourism on the local economy and the environment, an additional module to the questionnaire elicited responses from each household in the SV to a series of Likert-type questions. A total of 17 such questions were asked (9 positive ones and 8 negative ones) which can broadly be classified into questions capturing (i) economic impacts, (ii) socio-cultural impacts and (iii) ecological impacts.

6.1. Perceptions regarding the economic impacts of tourism

Positive impacts of tourism include the availability of better infrastructural facilities for the local population. Increased tourism is also likely to increase local prices in the region, particularly that of land. Local population with land stands to benefit from higher land prices even when they do not necessarily intend to sell their land soon. The increase in prices, while benefiting the traders who are involved in selling commodities and other services directly to the tourists, adversely affects the rest of the local population. Tourism may also result in increased income inequalities as benefits get pocketed by a handful of private players, who are often not the local residents.

The diverging stacked bar chart (Fig. 4) presents the frequency distribution of responses of the local residents in the SV, on questions that capture positive (top half of the chart) as well as negative economic impacts (bottom half of the chart) of tourism. In the same chart, we indicate the mode and median scores of the Likert-type responses in square and round brackets respectively, against each question. The chart is skewed to the left on questions about positive impacts, implying a general disagreement with the flow of economic benefits from tourism. The chart is skewed to the right on questions about negative impacts, implying a general agreement with the adverse impact of tourism on local prices and income distribution. The median and mode values of responses represent a general sense of disappointment among the local residents with the impact of tourism on the local economy, particularly on general prices and income inequality. While most of them agree with the fact that tourism benefits the traders and other tourism service providers, they state that most of the beneficiaries are 'outsiders', who do not reside in the nearby villages. Also, according to most of them, greater tourism has not resulted in better infrastructural facilities in the region.

6.2. Perceptions regarding the socio-cultural impacts of tourism

Socio-cultural impacts of tourism include the changes brought about in the lives of the local population, their culture, arts, customs and rituals and traditional lifestyles. These influences are difficult to identify and measure, involving a lot of value judgments. The two main negative socio-cultural impacts of tourism perceived by the local population are erosion of faith

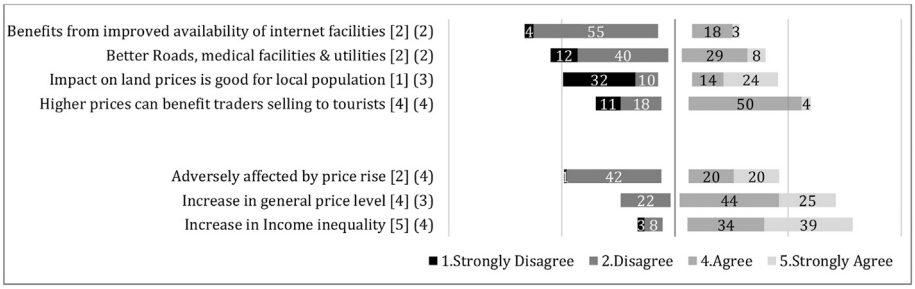

Fig. 4. Frequency distribution of responses on economic impacts of tourism. Notes: (a) Mode and median values of responses to each Likert-type question are indicated in square and round brackets respectively. (b) The number of 'Neutral' responses with a score of 3 is represented by the blank space in each stacked bar. (c) The total number of responses = 95.

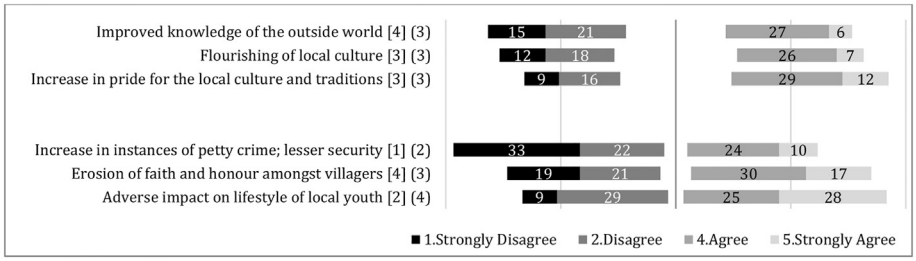

Fig. 5. Frequency distribution of responses on socio-cultural impacts of tourism. Notes: (a) Mode and median values of responses to each Likert-type question are indicated in square and round brackets respectively. (b) The number of 'Neutral' responses with a score of 3 is represented by the blank space in each stacked bar. (c) The total number of responses = 95.

among villagers and an adverse impact on the lifestyle of the local youth (see Fig. 5). On the whole, the respondents expressed mixed sentiments about the socio-cultural impacts of tourism (mode and/or median values are equal to 3 for most questions).

6.3. Perceptions regarding ecological impacts of tourism

Local perceptions regarding the ecological impacts of tourism are largely mixed. Most of the residents are aware and concerned about the adverse impacts of growing tourism in the form of rising pollution levels and greater disturbance for forest animals. Also, while most residents state that greater tourism reduces opportunities for forest exploitation, they spill the beans during informal group discussions on how the locals continue to enter the forest space illegally to collect timber for cooking purposes. Many respondents use the forest for grazing their cattle especially during the monsoon season when the forest is closed for the tourists.

Local residents unanimously agreed that tourism deters poaching (see Fig. 6). Tourist vehicles going into the jungle with visitors are a deterrent to poachers. Most of the poaching occurs during the period when the park is shut for visitors. The mode and median values of the Likert responses capture the general agreement of local residents with the positive as well as negative ecological impacts of tourism.

The broad conclusions drawn from responses to the 17 Likert type questions are summarized as follows:

(i) Most residents *disagree* with the view that tourism has generated *positive economic impacts*;

Most residents *agree* with the view that tourism has generated *negative economic impacts*;

(ii) Residents have a *neutral*/mixed view on the positive and negative *socio-cultural impacts* of tourism;
(iii) Most residents *agree* with the *positive and negative environmental impacts* of tourism.

Without attempting to club the views on positive and negative impacts, we broadly conclude that the local community residents are disappointed with the economic impacts of tourism on the general price level and the distribution of tourism income. There is a mixed response on overall socio-cultural impacts. Local perception of the beneficial environmental impacts of tourism is positive, particularly from the point of view of conservation of forest and wildlife.

7. Qualitative findings from key-informant interviews

This section summarizes the crucial insights obtained from key informant interviews conducted with community leaders and local experts who have first-hand information about the community. They include the chief conservator of forests (state forest department), elected heads (*sarpanch*) of the SV and CV, the founder of an NGO active in the region and the head of a private hotel's management. The broad findings from these interviews, which were conducted to identify the overarching sources of conflict between the local population and other diverse stakeholders around the park, are summarized below:

- A sense of alienation and resentment is brewing among local residents who feel bereft of the benefits of tourism development in the park. Most regular and well-paying jobs are taken up by outsiders while the locals have to contend with seasonal and low paying jobs. Selection of forest guides is through a competitive country-wide level exam, with no special concession/reservation for the local population.
- There is an evident monopoly of large outside players and breaking into the cartel is an impossible task for the locals. Local transport services are monopolized by the hotels and a few well-heeled residents who own the vehicles that are used for the jungle safaris. The local handicraft industry is dominated by a few large private entrepreneurs, who employ local women at very low daily wages. Large tour operators and owners of big hotels collude and offer all-inclusive tour packages and safari bookings at a premium to tourists, limiting the scope for locals to enter into direct trade with the visitors. Limited host-tourist interaction also minimises the possibility of beneficial cultural exchange.
- Existing local level interventions by the government and civil society to preserve local tribal and traditional art seem to have failed. Vested interests, corruption and nepotism have hampered the flow of benefits to the local community.
- Forest management faces constant pressure to generate higher tourism revenue. It is ill-equipped to plan and implement inclusionary conservation policies. The only body where the local population gets some representation is the Local Advisory Committee for park management, which is constituted by the state government. However, this committee has

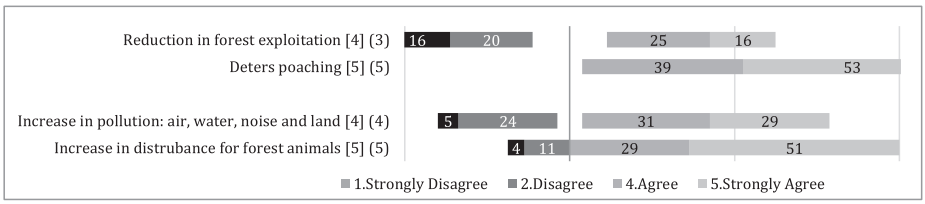

Fig. 6. Frequency distribution of responses on ecological impacts of tourism. Notes: (a) Mode and median values of responses to each Likert-type question are indicated in square and round brackets respectively. (b) The number of 'Neutral' responses with a score of 3 is represented by the blank space in each stacked bar. (c) The total number of responses = 95.

nothing more than an advisory role on issues of the management of the park and it is largely dysfunctional.

Thus, the local community experiences a sense of alienation on various fronts. Conservation efforts and tourism development around the park have failed to provide tangible benefits to them, as borne out by the empirical findings presented in section 5 and the analyses of community perception of tourism impacts on livelihoods presented in section 6. Despite being the indigenous community, the residents feel that they have become the 'outsiders' in the development process, who seem to have fallen through the cracks.

8. Conclusion

This study set out to empirically assess the impact of tourism participation on household wellbeing. The differential impact of tourism on local livelihoods could not be established through regression analyses, even after factoring in other important determinants such as per capita land size, household size, literacy levels and the extent of participation in non-agricultural activities. The tourism sector does not offer better employment opportunities. Neither does it significantly enhance the income-earning potential of the local population. It simply offers another employment alternative for households with meagre agricultural land and income. We find evidence of indirect benefits reaped by the non-participating households only to the extent of being able to afford a higher level of expenditure on non-food items. On the whole, tourism in the area does not contribute to the higher income and expenditure potential of households in the host community.

Our findings are contrary to some of the recent work on the impact of tourism development in PAs on the livelihoods of local communities in India. For instance, Chundawat et al. (2018) estimate the benefits from the wildlife tourism industry in the Ranthambore tiger reserve in India and find that the local communities are the main beneficiaries with more than 55% of the total turnover from the tourism industry trickling down to the local economy. The study is heavily guided by the objective of promoting commercial tourism in the region. The economic value of tourism and the distribution of its benefits to the local population are estimated in terms of the number of visitors, tourism revenue generated through park fee, hotel occupancy, number of jobs created for locals in the hospitality business etc. The estimates of benefits to the local population are based on the understanding that all tourism income stays within the local economy, thus overlooking the possibility of leakages. Another study by Karanth et al. (2012) states that nearly 65% of the tourists to India believed that the local people benefit from tourism to the parks. We believe this study provides a far more in-depth analysis of accrual and percolation of tourism benefits within the local community. The benefits are assessed not just in terms of income and expenditure capabilities of households, but also in terms of the overall perception of the local community vis-à-vis the economic and non-economic impacts of tourism.

Overall, we find that the host community perceptions are mixed on the livelihood impacts of tourism development in the area. They are aware of and in agreement with the beneficial environmental impacts of tourism on conservation and wildlife protection. However, there is a general sense of disenchantment with economic impacts, as most of them hold tourism responsible for price inflation and growing income inequality in the region. Community perception of the negligible livelihood-augmenting impact of tourism is corroborated by the empirical findings in this study. The qualitative findings from the key-informant interviews further validate the empirical findings by highlighting the contrasting ideologies of park use and conservation among the diverse stakeholders as the main source of conflict between them. Tourism development in the region has remained concentrated in the hands of a few, with a primary focus on increasing the number of tourists and revenue generated therefrom, at the cost of overlooking its social responsibility of generating more broad-based benefits for the local population. The quantitative and qualitative analyses in this study highlight the need for the adoption of appropriate tourism policies and conservation strategies that not just protect biodiversity, but also include and promote all stakeholders, with the local community being the most important one.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A

Table A1
List and definitions of variables used in empirical analysis.

Variable name	Description/definition
Expenditure variables	
Per capita expenditure on food	Monthly per capita expenditure on food = Total monthly expenditure on food by the household (HH) /size of the HH
Per capita expenditure on non-food	Monthly per capita expenditure on non-food = Total expenditure on (transport, water, electricity, fuel, clothing, toiletries, recreation, footwear, toys, wages paid, religious and social expenses) / size of HH
Per capita expenditure on Education-cum-Medical needs	Monthly per capita expenditure on medical and education = Total expenditure on medical and education / size of HH.
Per capita expenditure - total	Total monthly per capita expenditure = Per capita expenditure on food, non-food, education, and medical needs
Income variables	
Per capita income from agriculture	Monthly Per Capita Income from Agriculture and livestock = Total Monthly Income from Agriculture and livestock* / Size of the HH
Per capita income from non-agriculture activities	Monthly Per Capita Income from Non-Agriculture = Total Income from (Tourism related activities** + Petty Business + Casual labour + wages from government and private enterprises + others) / Size of HH
Per capita income- total	Total monthly per capita income = Per capita income from agriculture + Per capita income from non-agriculture activities
Household characteristics	
Adult Literacy rate	Proportion of adults (18 to 65 Years) who are literate = No of Literate adults (18 to 65 years) / Total Population (18 to 65 year)
Per capita landholding size	Per Capita Landholdings = Total Land holding of HH/ Size of HH
Dummy variable for livestock	Livestock Dummy = 1, if a household owns any livestock
Household size	Number of members in the HH; Size of the HH
Dummy variable for large household	Large Household Dummy = 1, if HH size >6 (median size = 6)
Proportion employed in non-agriculture	Proportion of Working Population working as casual labourer, those in petty businesses, government and private enterprises and others
Dummy variables	
Dummy variable for Tourism HH	Tourism HH Dummy = 1, for HHs in the SV that participated in tourism (SVp); zero for others
Dummy variable for study village HH	Village Dummy = 1 for HHs in the SV; zero for others

Notes (i) *Income from Agriculture = Income from crop Production + income from Livestock.
Income from Crop Production = Total Output in Quintals * Average Price per quintal.
Average Price Per Quintal = (Highest Price quoted + Lowest Price) / 2.
Income from Livestock = Income from Milk + Income from Sale of Livestock.
Income from Milk = Total Output (litres) * Price per litre.
Income from Sale of Livestock (sheep/ goats) = Number of livestock sold * price per livestock.
(ii) **Income from Tourism = Wage Income from Hotels + Handicrafts + Jeep/ cab services + Guides + Guards.

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