WILLINGNESS TO PAY FOR RECREATION AND PRESERVATION BENEFITS OF THE UNESCO CULTURAL HERITAGE SITE CHARAIDEO MAIDAMS IN NORTH-EAST INDIA

Utpal Kumar De*

Abstract

This study examines how socio-economic and demographic factors influence visitation to a UNESCO cultural heritage site in North-East India. Heritage tourism plays an important role in generating income and employment in North-East India, as the region is blessed with distinct natural and archaeological resources that attract many tourists every year. These sites possess both use and non-use economic values. They are valued not only for their direct recreational and educational benefits but also for their option, bequest, and vicarious values. The challenge in determining their true value stems from their non-market nature, where conventional economic mechanisms fall short. A regression method is used to examine the impacts of socio-economic and demographic factors on visitation to historical sites. At the same time, the recreational benefits enjoyed by visitors are estimated by employing both revealed and stated willingness to pay (WTP), specifically through the Travel Cost Method (TCM) and the Contingent Valuation Method (CVM). The analysis shows that travel distance and costs have a significantly negative impact on visit frequency, while higher income and education levels positively influence it. The estimated recreational benefits, based on both revealed and stated WTP for the site's preservation and improvement, justify raising recreation charges by introducing appropriate entry fees and maintenance.

Keywords: Tourist Heritage; Tourist Demand; Tourism Policy; Leisure and Tourism; Tourism Economy.

DISPOSIÇÃO A PAGAR PELOS BENEFÍCIOS DE RECREAÇÃO E PRESERVAÇÃO DO SÍTIO DO PATRIMÓNIO CULTURAL DA UNESCO CHARAIDEO MAIDAMS NO NORDESTE DA ÍNDIA

Resumo

Este estudo examina como fatores socioeconômicos e demográficos influenciam a visitação a um sítio do patrimônio cultural da UNESCO no nordeste da Índia. O turismo patrimonial desempenha um papel importante na geração de renda e emprego no nordeste da Índia, visto que a região é rica em recursos naturais e arqueológicos singulares que atraem um grande número de turistas anualmente. Esses sítios possuem valores econômicos tanto de uso quanto de não uso, semelhantes aos dos recursos ambientais, e são valorizados não apenas por seus benefícios recreativos e educacionais diretos, mas também por seus valores de opção, de legado e indiretos. O desafio de determinar seu valor real decorre de sua natureza não mercantil, na qual os mecanismos econômicos convencionais se mostram insuficientes. Este estudo utiliza o método de regressão para examinar como os impactos de fatores socioeconômicos e demográficos influenciam a visitação a sítios históricos, enquanto os benefícios recreativos desfrutados pelos visitantes em um sítio histórico são estimados por meio da disposição a pagar (DAP) declarada e revelada, especificamente por meio do Método do Custo de Viagem (MCV) e do Método de Valoração Contingente (MVC). A análise demonstra que a distância percorrida e os custos envolvidos têm impacto negativo significativo na frequência de visitas a um local, enquanto níveis mais elevados de renda e escolaridade influenciam positivamente essa frequência. Os benefícios recreativos estimados, com base na disposição a pagar (DAP) declarada e revelada para a preservação e melhoria do local, justificam o aumento das taxas de recreação por meio de mudanças nas políticas, como a introdução e a manutenção de uma taxa de entrada adequada.

Palavras-chave: Patrimônio Turístico; Demanda Turística; Política de Turismo; Lazer e Turismo; Economia do Turismo.

DISPOSICIÓN A PAGAR POR LOS BENEFICIOS DE RECREACIÓN Y CONSERVACIÓN DEL SITIO CHARAIDEO MAIDAMS, PATRIMONIO CULTURAL DE LA UNESCO, EN EL NORESTE DE LA INDIA

Resumen

Este estudio examina cómo los factores socioeconómicos y demográficos influyen en las visitas a un sitio del patrimonio cultural de la UNESCO en el noreste de la India. El turismo patrimonial desempeña un papel importante en la generación de ingresos y empleo en el noreste de la India, ya que la región cuenta con recursos naturales y arqueológicos únicos que atraen a un gran número de turistas cada año. Estos sitios poseen valores económicos tanto de uso como de no uso, similares a los de los recursos ambientales, y se valoran no solo por sus beneficios recreativos y educativos directos, sino también por sus valores de opción, legado y vicario. El desafío de determinar su verdadero valor radica en su naturaleza no mercantil, ante la cual los mecanismos económicos convencionales resultan insuficientes. Este estudio utiliza el método de regresión para examinar cómo los factores socioeconómicos y demográficos influyen en las visitas a sitios históricos, mientras que los beneficios recreativos que disfrutan los visitantes en un sitio del patrimonio histórico se estiman mediante tanto la disposición a pagar (DAP) revelada como la declarada, específicamente a través del Método del Costo de Viaje (MCV) y del Método de Valoración Contingente (MVC). El análisis muestra que la distancia recorrida y los costos incurridos tienen un impacto negativo significativo en la frecuencia de las visitas a un sitio, mientras que los mayores ingresos y los niveles educativos influyen positivamente en ella. Los beneficios recreativos estimados, basados en la disposición a pagar (DAP) revelada y declarada para la preservación y mejora del sitio, justifican el aumento de las tarifas recreativas mediante cambios en las políticas, la introducción de una tarifa de entrada adecuada y el mantenimiento.

Palabras clave: Patrimonio Turístico; Demanda Turística; Política Turística; Ocio y Turismo; Economía del Turismo.

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1 INTRODUCTION

Historical structures are some important links to the past, having cultural and architectural significance. These monuments reflect past heritage and traditions and serve as valuable repositories of knowledge, offering insights into ancient craftsmanship. The monetary worth of such historical, cultural, and archaeological sites is similar to that of environmental resources. It can be linked to an individual's willingness to pay (WTP) for their recreational or educational value and for preserving history.

This intrinsic value aligns with the concept of cultural services, emphasizing how such heritage contributes to cultural identity and experience. Xiang and Clarke (2003) noted that people's willingness to spend on guided tours, educational visits, and other recreational activities at these sites can gauge the value of historical sites. These illustrate the intangible yet substantial worth attributed to preserving and experiencing historical heritage (Garrod et al., 1996; Grosclaude & Soguel, 1994; Santos, Moraes & Alves, 2024).

Historical heritage resources (museums, monuments, archaeological sites) are unique tangible items that cannot be retrieved, and their economic value includes use value, option value, and existence value. This option value is a safeguard against uncertainties about the future availability of these resources. It encompasses three dimensions: preservation value to ensure future use ***(future use value)***; ***bequest value*** to ensure availability for future generations; and ***vicarious value*** to ensure accessibility for others.

The precise economic value of an environmental resource is the total of its actual use value, option value, and existence value (Banerjee, 2003). These attributes align with the notion of irreversibility in environmental economics: once altered or destroyed, these resources are unlikely to be restored to their original condition (Solow, 1993). Market forces often fail to capture the full recreational value of such non-market goods.

Therefore, understanding diverse motivations of visitors and the role of socio-economic factors behind their visit decisions is crucial for policy purposes. Visitors' social, economic, and demographic attributes are expected to significantly influence their desire to visit a historical site and affect its perceived value (Carrus et al., 2015).

This study examines how various socio-economic and demographic factors affect visit rates to the selected historical site, estimates the visit demand function, potential visitors' willingness to pay, and ultimately the recreational benefits they enjoy.

Some visitors may have motives beyond recreation, which adds to the challenge of valuing multiple attributes or goods associated with the site. This inherent issue in evaluating historical resources is addressed thoughtfully in this paper to recognize and minimize estimation error, with a particular focus on recreation benefits.

This paper's novelty lies in estimating existence value, along with existing recreation and cultural value, of UNESCO cultural heritage in North-East India using a combination of travel cost and contingent valuation techniques.

This study examines how different socio-economic and demographic variables affect visit rates to the chosen site. It then estimates the trip generation function (TGF) and maximum WTP of visitors, as well as recreation benefits (consumer surplus, CS) derived by tourists and local visitors.

2 REVIEWS OF RELEVANT STUDIES ON VALUATION

Analyses of the recreation and existence value of natural and semi-natural tourist resources have evolved significantly since the mid-20th century. Researchers have used methods such as the Travel Cost Method (TCM) and Contingent Valuation Method (CVM), payment cards, and deposit-refund systems for this purpose. These approaches have become increasingly popular because they can assign monetary value to such resources, enabling conservation, despite some limitations (Santagata & Signorello, 2000; Freeman, 2003).

Several early studies demonstrated the impact of socio-economic variables on conservation and provided a foundation for refining these methodologies to improve the estimation accuracy (Knetsch & Davis, 1965; Navrud & Mungatana, 1994). Santos, Moraes & Alves (2024) argued for conserving heritage sites to sustain urban community-based tourism in Brazil under market pressure.

Silva Júnior, Maranhão and Nóbrega (2025) observed competition among agents to control tourist resources in the historic center and port area of Natal. They concluded that the subordinate agents resist this dominance. Amazonas et al. (2021) identified water quality as an important factor in beach selection and a driver of destination choice on São Paulo's south coast.

Empirical studies on the benefits of the historical cultural heritage have been conducted since the 1980s, focusing on theatres, historical monuments, and museums (Pearce & Ozdemiroglu, 2002; Noonan, 2003; Borah, 2024). Subsequently, researchers have expanded the scope to a wide range of cultural and historical assets, using scientific valuation techniques to estimate both tangible and intangible benefits. Montenegro et al. (2009) evaluated historical heritage sites in Valdivia, Chile, using a regression method and TCM, while Voltaire et al. (2017) used the Zonal Travel Cost Method (ZTCM) for Mont-Saint-Michel to estimate the economic value of cultural heritage sites. These studies unearthed the complex interplay of economic valuation and cultural preservation, emphasizing the need for nuanced approaches in approximating historical site value.

Valuation studies in India have focused on both natural and cultural heritages to understand conservation and tourism management. Chopra (1998) applied CVM and TCM to estimate the monetary value of parks and natural reserves, revealing significant willingness to pay for conservation. Recent studies have explored the economic value of heritage sites, employing a combination of valuation techniques to assess visitors' satisfaction and their willingness to pay.

These studies provide valuable insights into the economic importance of cultural and natural sites in India and guide conservation strategies (Dutta et al., 2007; De & Devi, 2011; De & Borah, 2025; Verma et al., 2017; Baitalik & Bhattacharjee, 2023).

3 DATA AND METHODOLOGY

Both secondary and primary data were used for analysis. Secondary data on the population of different regions (states), the origin of visitors to the selected site, per capita net state domestic product, literacy, and domestic and international tourist arrivals were collected from various reports of the Ministry of Tourism, Government of India, Basic Statistics of the North-Eastern Region and various states of India, Census of India, and the Archaeological Survey of India.

Primary data was collected through a field survey involving direct interviews using structured questionnaires. A total of 240 tourists, including 37 international visitors, were surveyed during 2022. Most domestic and foreign tourists visited the site during the peak tourist season, from October to April, for favourable weather conditions and because of official holidays in their regions of origin.

The sample respondents were selected by simple random sampling without replacement. Information on their socio-economic and demographic backgrounds, frequency of visits to the study site during the past five years, purpose of travel (solely for recreation or combined with any other activity), mode of travel, travel expenses, costs of accommodation and food, loss of working days, if any and their monetary value (opportunity cost), local transportation and other expenses such as parking and entry fees associated with the visit, and their willingness to pay over and above the existing fees for the maintenance and improvement of the site was collected.

Existing literature on the valuation of historical sites suggests the application of one or a combination of the methods mentioned above, depending on the specific purpose of the study. Because this study seeks to determine the recreational value of a UNESCO cultural-historical heritage site in the study area, TCM (based on the suitability of Individual and Zonal travel costs) was employed to estimate the 'demand function' for the monument. CVM was also used to understand WTP, as revealed by respondent tourists, for the preservation and maintenance of recreational facilities and other associated infrastructure at the site.

In this study, CVM was used to estimate visitors' WTP for maintaining and enhancing facilities at the site. This method attempts to measure the worth of a non-marketed good holistically. CVM uses contingent valuation questions such as dichotomous choice, open-ended referendum, iterative bidding, and payment cards, each with merits and demerits and numerous variations in application. The study used both dichotomous and multiple-choice questions, depending on the variable pattern in the survey, to obtain data from tourists.

To avoid starting-point bias, dichotomous choice bias, and part-whole bias, the study used iterative bidding in direct interviews to collect primary data. The process began with a significantly high bid value (about twice the existing fee), and respondents were asked whether they were willing to pay this amount. If they agreed, the bid was raised until they became reluctant to pay the last proposed amount. Conversely, if they disagreed with the initial quote, the bid value was gradually reduced until they agreed to the final proposed value.

After collecting primary data, the data were tabulated and organized according to the place of origin of the surveyed tourists. The respondents' socio-economic and demographic characteristics were also categorized by zone. The sampled tourists were from twenty-five Indian states and union territories, grouped into seven zones based on the mean distance of origin from the tourist site. Because there were few foreign tourists, they were grouped into a single Zone 8.

We analyzed the impact of different factors on the frequency of visits by the sampled tourists using regression. In this case, individual TCM was used. In the case of visitors whose primary objective of visit was recreational, total expenses, including travel and other associated expenses, were considered for computation. However, if the tour was undertaken alongside any other business-related or institutional activity, or to attend conferences sponsored by other organizations, only local travel expenditure and the opportunity cost of the additional time spent were counted.

Only a few visitors were on a packaged tour, and their primary objective was to visit Kaziranga National Park in the neighbourhood and the study site, i.e., the Charaideo Maidams. For this analysis, we considered travel expenditures to visit the Charaideo Maidams, along with relevant accommodation, meals, and opportunity costs.

ZTCM estimated the visit demand function, as Clawson advocated. Most visitors from zones other than Zones 1 and 3 visited this site only once. Thus, inter-individual variation in visit rate was minimal. As a result, when this visit frequency was regressed against other exogenous variables, the regression R-square and F-statistics were very low, making the model highly insignificant. The ZTCM has been implemented through the following steps:

i. First, sampled respondents were grouped by their zone of origin (here, political boundary/state).

ii. Then, the number of visitors from each zone and the zonal share of the total sample were computed.

iii. Thirdly, total annual visits from each zone were computed by multiplying relative shares with total annual visits to the site (obtained from the secondary source).

iv. Fourthly, average visit rate from each zone was calculated by dividing total annual visits by the respective zonal population.

v. Thereafter, the demand curve was estimated, and, using that function, the recreational benefit was calculated.

The area under the estimated demand function, computed for the average expenditure per trip, yielded the estimated recreational value that a tourist generated by visiting this site. This value was then extrapolated to all visitors to estimate the site's total recreational benefits. The structural equations for estimation would be written in implicit form as:

$$V_i = g(ATC, Y, ADT, E, EQ, A, U_1) \ldots \ldots \ldots (1)$$
$$ATC = h(ADT, Y, V_i, U_2) \ldots \ldots \ldots (2)$$

Here, V_i represented visit rate, ATC the average total cost per round trip to the site per tourist, Y was the per capita Net State Domestic Product (PCNSDP), ADT was the average distance from the zone of origin to the site, E was the type of employment, EQ the educational qualification of

the respondents, A denoted the age of surveyed tourists, and U_1 and U_2 were random disturbances that follow all the classical regression properties.

This structural form simultaneous equation system (including equations 1 and 2) encountered endogeneity in ATC and Vi; thus, they were interconnected. Equation (2), the inverse demand function, was over-identified. Also, V_i in equation (2) was correlated with other exogenous variables, causing multicollinearity. However, variables such as infrastructure (transport and communication networks), purpose of visit, and access to information also influenced tourists' visiting decisions. However, we could not include these variables because reliable data were scarce. The random disturbance term potentially captured effects of those variables.

To obtain consistent and reliable estimates, we employed the two-stage least squares (2SLS) method. For the first equation, we included all survey-collected variables. However, to estimate the demand function using ZTCM, we considered only three major explanatory variables—distance, literacy rate, and per capita NSDP. The estimated visit rate (obtained from the first equation) was regressed on these three variables in the second stage to estimate the demand function and ultimately the consumer's benefit (CS).

Unlike Gillig et al. (2003), the present study estimated the trip-generating function separately for both revealed willingness to pay (WTP) from the actual travel cost data and for stated WTP by using contingent valuation data. This dual estimation enabled us to identify visitors' maximum WTP for preserving this UNESCO cultural heritage site in the study area.

4 RESULTS AND ANALYSIS

We estimated the site's recreational benefit, or consumer surplus, using primary data collected from a field survey of 240 tourists. Most tourists visited the site with family or in groups with friends, and group size varied significantly. To standardize the collection of data, only one senior member (or group leader) from each group was interviewed.

Thus, although there were 240 respondents, the sample represented 1074 visitors, including both domestic and international tourists. For analysis, only respondents' socio-economic characteristics were considered, as each respondent represented their respective groups in almost all aspects.

4.1 The Area of Study

The contribution of the tourism sector to the Indian economy, and to its North-Eastern region, is well recognized. According to the World Economic Forum (WEF) 2024 report, India ranks 39th among 119 countries worldwide, a significant improvement from 54th in the 2021 Travel and Tourism Development Index.

In North-East India, Assam has rich historical and natural attractions, most notably the ***Charaideo Maidams***, popularly known as the ***"Pyramids of Assam"***. These royal burials of the Ahom dynasty, nestled in its picturesque landscape, display its rich cultural heritage. Despite historical significance, such tourism contributes minimally to the state's net domestic product.

Assam recorded 98.31 lakh visitors in 2023, of whom 98.12 lakh were domestic visitors, and 18,946 were international tourists. In 2022, these figures were 17.02 lakh domestic and 1,231 foreign visitors, for a total of about 17 lakh tourists (India Tourism Statistics, 2023).

The Charaideo Maidams consist of 42 royal Egyptian-style pyramids, or tombs, on a hill, displaying the remarkable art of medieval Assam. UNESCO inscribed it as a World Cultural Heritage Site in 2024. North-East India's Charaideo Maidam is the 43rd World Heritage Site and the first cultural site from the region to be included.

This comprehensive study assesses the recreational benefits and preservation value associated with this site, helping explain people's WTP for conserving these resources. Such an assessment would guide policymakers in making informed decisions for the sustainable preservation of this historical site.

4.2 Socio-Economic and Demographic Characteristics of the Surveyed Tourists

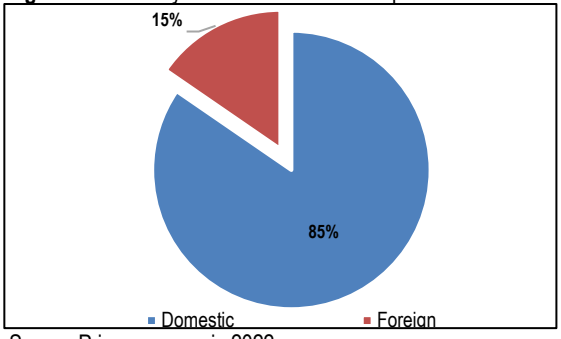
The social and economic characteristics of visitors are potential factors in evaluating any recreational benefit assessment. As the current study seeks to compute the visit rate and to examine the impact of various factors, it was pertinent to observe the socio-economic profile of the sampled visitors. The visitors' social, demographic, and economic status includes information on gender, age, marital status, educational level, family size, nature of employment, monthly income, distance covered to reach the study site, and the availability of recreational programmes at the concerned site.

These factors matter because gender, age, marital status, and nature of employment affect visitors' physical mobility, while income and required expenditure may affect tourists' capacity to travel. Further, distance travelled may affect the time needed for the visit and may be associated with the opportunity cost.

4.3 Distribution of the Surveyed Tourists by Nationality

Of the 240 respondents, 203 (85 percent) were domestic tourists, and 37 (15 percent) were of foreign origin. Figure 1 shows the distribution of surveyed tourists by nationality.

Figure 1. Nationality-wise Distribution of Sample Visitors.



Source: Primary survey in 2022.

4.4 Distribution of the Surveyed Tourists According to their Zone of Origin

Table 1 shows the frequency distribution of sample tourists by distance from origin. Of the 240 respondents representing 1074 tourists in the sample, 25 percent were from Zone 1, 9.17 percent were from other North-East Indian states excluding Assam and Sikkim (Zone 2), and only a few were from Zones 6 and 7. The largest number of respondents were from Zone 1, followed by Zone 3 (17.5 percent) (West Bengal, Orissa and Bihar).

Zone 5 (Delhi, Haryana, Punjab, and Rajasthan) accounted for just 13 percent of the sample. 11.25 percent of the respondents were from Zone 4 (Chhattisgarh, Madhya Pradesh, and Uttar Pradesh). Lastly, 15.42 percent were foreign tourists (Zone 8).

Table 1. Distribution of Respondents As per their Origin.

Zone	*States Included in the Zone*	*Average Dist. of Zone from the Site (Km)*	*Number of Respondents*	*Sample Size*
Zone1	Assam	< 500	60 (25.0)	301 (28.0)
Zone2	North-East Zone: Arunachal, Manipur, Meghalaya, Mizoram, Nagaland, Tripura	< 1000	22 (9.2)	110 (10.2)
Zone3	East Zone: Bihar, Orissa, Sikkim, West Bengal	< 1500	42 (17.5)	167 (15.5)
Zone4	Central Zone: Chhattisgarh, Madhya Pradesh, Uttar Pradesh	< 2000	27 (11.3)	133 (12.4)
Zone5	North Zone: Delhi, Haryana, Punjab, Rajasthan	< 2500	32 (13.3)	154 (14.3)
Zone6	West Zone: Gujarat, Maharashtra	< 3000	11 (4.6)	55 (5.1)
Zone7	SouthZone: Andhra Pradesh, Karnataka, Kerala, Tamil Nadu	< 3500	9 (3.8)	43 (4.0)
Zone8	Foreign	<15000	37 (15.42)	111 (10.34)
Total			240	1074

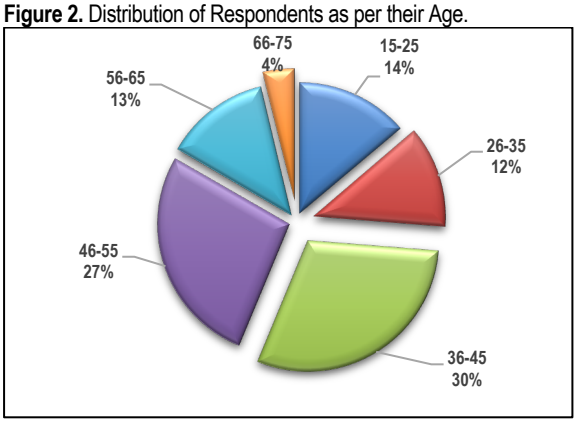
Source: Primary survey in 2022.
Note: Figures in the parentheses represent percentages of the total.

The percentage of surveyed tourists varies inversely with the distance of the particular zone. Table 1 also indicates the distribution of the 1074 surveyed tourists, a part of which (240) was included as sample respondents for the collection of information. The distribution shows a similar pattern to that observed in the respondents across the zones.

4.5 Age Distribution of Surveyed Tourists

The majority (30 percent) of surveyed tourists were in the 36-45 age group, followed by 27.08 percent in the 46-55 age group. Age groups 26-35 and 56-65 years account for 12.5 and 12.92 percent, respectively, while age group 66-75 accounts for a very small 3.75 percent. The 15-25 age group constitutes 13.75 percent, mostly from zones 1, 2, and 3.

Figure 2. Distribution of Respondents as per their Age.



Source: Primary Survey during 2022.

4.6 Distribution of Tourists According to their Gender and Marital Status

Distribution of respondents according to their gender (Table 2) indicated that 43.8 percent of the sample were female and 56.3 percent were male. Of these, 59.2 percent were married, and the rest were unmarried (Table 2).

Table 2. Distribution of Respondents as per Gender and Marital Status. *Source:* Primary Survey during 2022.

	Gender		**Marital Status**	
Zone	**Female**	**Male**	**Married**	**Unmarried**
Zone1	28 (46.7)	32 (53.3)	22 (36.7)	38 (63.3)
Zone2	9 (40.9)	13 (59.1)	12 (54.6)	10 (45.5)
Zone3	19 (45.2)	23 (54.8)	34 (81.0)	8 (19.1)
Zone4	10 (37.0)	17 (63.0)	19 (70.4)	8 (29.6)
Zone5	15 (46.9)	17 (53.1)	19 (59.4)	13 (40.6)
Zone6	4 (36.4)	7 (63.6)	8 (72.7)	3 (27.3)
Zone7	4 (44.4)	5 (55.6)	7 (77.8)	2 (22.2)
Zone8	16 (43.2)	21 (56.8)	21 (56.8)	16 (43.2)
Total	105 (43.8)	135 (56.3)	142 (59.2)	98 (40.8)

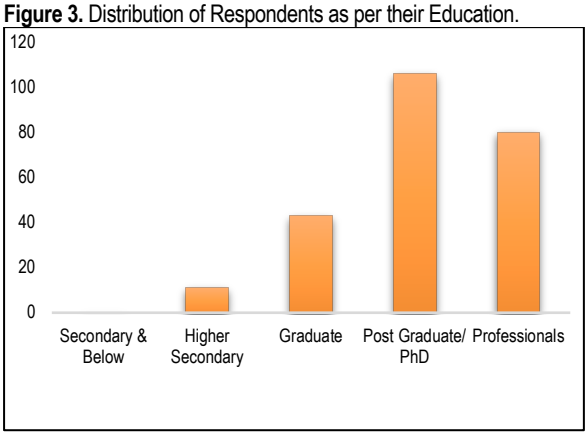
Source: Field Survey by the researcher during 2021-22.
Note: Figures in the parentheses represent percentages of the total.

4.7 Distribution of Surveyed Tourists according to their Educational Qualification

The distribution of respondents by education level shows that only 4.6 percent had the lowest level of education (Higher Secondary), and 17.9 percent were Graduates. The

largest group (44.2 percent were postgraduates or doctoral degree holders. The second largest group (33.3 percent) had professional degrees (Figure 3).

Figure 3. Distribution of Respondents as per their Education.

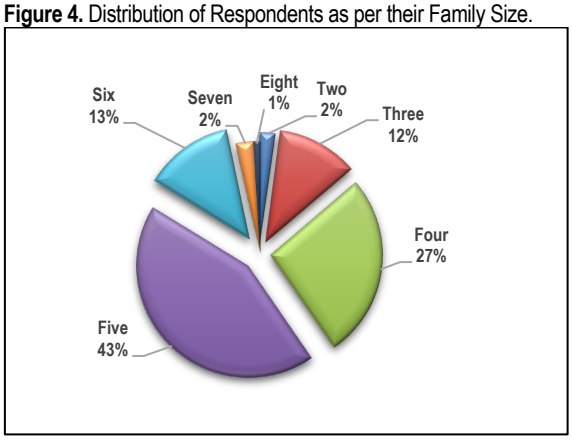


Source: Primary Survey during 2022.

4.8 Distribution of the Surveyed Tourists According to their Family Size

Only 2 percent of respondents reported the smallest family size of 2 members. The second group, 12 percent, had a family size of 3 members. 27 percent had a family size of 4 members. The largest group, constituting 43 percent of the sample, had a family size of 5, and 16 percent had a family size of 6 or more.

Figure 4. Distribution of Respondents as per their Family Size.

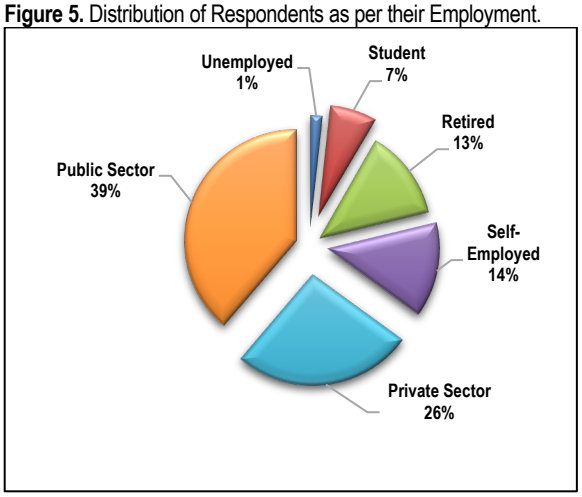


Source: Primary Survey during 2022.

4.9 Distribution of Surveyed Tourists according to their Employment Characteristics

Of the 240 respondents, only 1.67 percent were unemployed, and 6.67 percent were students, while 12.92 percent were retired. The majority (38.75 percent) were public sector employees, 26.25 percent were private sector employees, and 13.75 percent were self-employed visitors. Employment-wise distribution is almost identical across the zones.

Figure 5. Distribution of Respondents as per their Employment.



Source: Primary Survey during 2022.

4.10 Distribution of Surveyed Tourists According to Total Monthly Family Income

20.83 percent of respondents belonged to the monthly income range of INR 60001 to 70000, followed by 18.33 percent of the respondents with monthly income more than INR 90000, where most of the tourists are from zone-8, i.e. foreign tourists (Table 3). The intra-zonal distribution, however, reflects that the percentage of respondents with higher monthly family income was positively associated with the distance of the respective zone. A higher percentage of respondents in the low-income level from neighbouring zones aligned with the required expenditure level and the zone's distance.

Table 3. Distribution of Respondents According to their Total Monthly Family Income (INR).

Zone	Up to 20000	20001-30000	30001-40000	40001-50000	50001-60000	60001-70000	70001-80000	80001-90000	Over 90000	Total
Zone-1	2	8	19	13	12	1	2	2	1	60
Zone-2	0	0	3	11	5	2	1	0	0	22
Zone-3	0	0	0	5	15	16	3	2	1	42
Zone-4	0	0	0	2	8	7	6	3	1	27
Zone-5	0	0	0	0	0	18	12	1	1	32
Zone-6	0	0	0	0	0	5	2	2	2	11
Zone-7	0	0	0	0	0	1	3	4	1	9
Zone-8	0	0	0	0	0	0	0	0	37	37
Total	2 (0.8)	8 (3.3)	22 (9.2)	31 (12.9)	40 (16.7)	50 (20.8)	29 (12.1)	14 (5.8)	44 (18.3)	240

Source: Primary Survey during 2022.
Note: Figures in the parentheses represent percentages of the total.

4.11 Determinants of Visit Frequency of the Tourists

Several variables influence visit frequency, including disposable income, leisure time, age, gender, marital status, and household size. High disposable income and ample leisure time generally increase the likelihood of frequent visits to recreational sites.

Geographical factors, such as distance to the site and the quality of tourism infrastructure, also affect travel decisions. Longer travel distances tend to reduce visit frequency because of higher travel expenses, time requirements, and opportunity costs, often measured using a minimum daily wage (set by the Government of India) as a proxy for lost income during travel.

The distance travelled to reach a spot is important in determining how often people visit a particular destination. Holding other factors constant, it is expected to be inversely related to the distance travelled from the tourist's origin to the destination and their number of visits. Simply put, longer travel distances are associated with higher travel expenses, require more time, involve higher opportunity costs, and carry greater travel hazards.

These factors are presumed to affect tourists' visit frequency adversely. Therefore, contrary to the null hypothesis that distance has no effect, the alternative hypothesis asserts that distance substantially reduces visit frequency. Similarly, the expenses related to travel and other associated costs borne by tourists/visitors are also presumed to exhibit a significant negative relationship with their number of visits to the site.

Level of education and income are considered to have a significant positive influence on visit frequency. Tourists' educational level is a key factor likely to influence individuals' earning capacity positively. Higher qualifications are also correlated with increased awareness, curiosity, and a desire to learn more about archaeological heritage sites, especially among those involved in history, architectural intelligence, archaeological preservation, photography, and historical interests.

Thus, visitors' educational status is expected to have a significant positive impact on visit rates to certain locations. Similarly, higher income increases an individual's ability to spend. Consequently, it is expected to affect tourists' visit frequency positively.

Also, government employees in India benefit from travel incentives such as Leave Travel Concessions (LTC) and better job security, making them more likely to travel for outings than self-employed individuals and private-sector workers facing higher opportunity costs. Thus, employment type is expected to influence travel decisions, and public-sector employees are likely to travel more for recreation.

The regression analysis includes a dummy variable (DE), taking the value 1 for public-sector job holders and 0 for others. Age also affects travel behaviour: individuals between 36 and 55 are likely to travel more because of stable finances and better health, whereas younger and older individuals may travel less frequently because of financial and health constraints (Uprety & Sharma, 2012).

Consequently, plotting the number of visits by tourists against their age is likely to show a trend resembling an inverted U-shaped curve. It follows that the absolute difference between tourists' ages and the mean age is expected to affect their visit rate negatively.

The travel preferences of individuals are also influenced by gender. In many regions, women face domestic responsibilities and have limited influence over travel decisions. Additionally, many women tend to avoid jobs that require extensive travel. Thus, the tourist demographic is expected to show a male bias.

To assess this, we introduce a dummy variable, DG, which takes the value 1 for male respondents and 0 for others. Marital status is another crucial factor affecting travel plans. Generally, young couples are observed to travel more frequently than single individuals. Similarly, older individuals typically do not travel solo, with most travellers being senior married couples, as the survey results indicate. To evaluate the impact of gender on visit frequency, we introduce another dummy variable, DM, which takes the value 1 for married respondents and 0 for others.

Using the individual travel cost technique, we regress visit frequency on key explanatory factors to examine how different socio-economic features affect the visit frequency of the surveyed tourists. Because the semi-log model provides better results (Bann, 1998), it is used here. The equation can be written as:

$$V_i = \alpha_o + \alpha_1 \ln TC_i + \alpha_2 \ln Y_i + \alpha_3 \ln DT_i + \alpha_4 \ln (A_i - \mu)^2 + \alpha_5 E_i + \alpha_6 DE_i + \alpha_7 \ln FS_i + \alpha_8 DG_i + \alpha_9 DM_i + \alpha_{10} TM_i + \alpha_{11} GV_i + \alpha_{12} DV_i + e_i \quad \ldots (3)$$

V_i = number of times i^{th} individual visited the site (if multiple visits are observed in the data).
TC_i = total cost for one round trip to the site for the ith individual.
Y_i = total monthly household income of ith respondent (INR/month).
DT_i = one-way distance covered by i^{th} respondent to visit the site.
A_i = age in years of ith individual, and μ = average age in years of the surveyed respondents.
E_i = educational level of ith respondent.
DE_i = nature of employment of ith respondent (DE_i = 1 for public sector employee, 0 otherwise).
FS_i = family size of the i-th respondent; DG_i = gender of the i-th respondent (DG_i = 1 if male, 0 otherwise).
DM_i = marital status of the i-th respondent (DM_i =1 if married, 0 otherwise).
TM_i = transportation mode of the ith respondent.
GV_i = number of group visitors of the ith respondent.
DV_i = first visit of the respondent (DV_i = 1 if yes, 0 otherwise).

With the typical features of classical linear regression, ei represents the random disturbance term. The logarithmic value of the visit rate is not considered here, as many tourists made their first visit to the site.

Two-way correlation among relevant explanatory variables is presented in Table 4. The results show statistically significant positive correlations between a visitor's total monthly family income from all sources, distance covered, and travel cost incurred by the tourist. Consequently, travel costs already account for part of the effect of distance covered.

Table 4. Two-Way Correlation among the relevant Explanatory Variables.

	Gen	Marital	Edu	Age	Dist.	FSize	TC	Month Income	Empl.	No of visit
Gen	1	-.12	.31**	.16*	.08	.07	.16*	.14*	-.09	.16*
Marital		1	.08	-.27**	.22**	.25**	.23**	.28**	.21**	.12
Edu			1	-.12	.18**	.21**	.27**	.26**	.13	-.01
Age				1	-.04	-.07	.005	-.02	-.37**	.11
Dist.					1	-.27**	.94**	.80**	-.14*	-.39**
FSize						1	-.22**	-.18**	.19**	.32**
TC							1	.86**	-.20**	-.32**
Month Income								1	-.12	-.11
Empl.									1	.08

Source: Primary survey in 2022.
Note: Correlation is significant at 1% (**) and 5% (*) levels of significance (2-tailed). N=240.

The significant positive correlations between monthly income and both education and travel expenses indicate that income plays a role in shaping tourists' spending behaviour. Also, correlations between distance covered and travel cost highlight that longer distances are generally associated with higher travel expenditure, although such expenditure also depends on the mode of travel. Individuals with varied incomes also prefer specific transportation modes.

These findings provide an important foundation for informed decision-making in the tourism industry, enabling stakeholders to identify and adopt strategies and services to meet the distinct characteristics and preferences of diverse tourist groups at different destinations.

The regression results show that, in all cases, visit frequency is positively related to the visitor's per capita family income and negatively affected by the distance travelled to reach the site from the tourist's area of origin and per-person travel expenses for a single round trip to the site (Table 5). Consequently, visit frequency is adversely affected by both distance and per-person trip expenditure. Moreover, a significant positive correlation is observed between travel distance and expenses incurred, indicating that travel expenditures already reflect part of the impact of travel distance.

Table 5. Semi-Log Linear Regression Results using Individual Travel Cost Method

Variables	Coeff.	t	Sig.
Const	-.053	-.061	.952
Gender	.058	.932	.352
Marital status	.059	.839	.402
Education	-.078	-2.016	.045*
Age	-.010	-.545	.586
Distance (km)	-.242	-3.630	.000**
Family Size	.170	1.284	.200
Travel Cost (INR)	.177	1.986	.048*
Monthly Income	.210	2.039	.043*
Employment	.193	2.838	.005**
Transportation Mode	-.046	-.675	.500
No. of group visitors	.017	.737	.462
First visit	-1.366	-18.243	.000**
R^2, Adjusted R^2, SE, F	0.757, 0.744, .424, 58.818		

Note: (i) * and ** represent that the coefficient is significant at the 1% and 5% levels by a one-tailed test. (ii) SE denotes the standard error of the estimate.

4.12 Estimation of Visit Demand Function and Recreation Benefit

The Zonal Travel Cost method (ZTCM) is employed to estimate the Trip Generation Function (TGF). The TGF is derived by optimizing the visitors' utility function given their budgetary constraints, aligning with neoclassical analysis (Nillesen, 2002; Khan, 2003). A visitor is considered a typical consumer who allocates her/his budget rationally between a market good (QM) and a public good (V), in this particular case, visiting a tourist destination. The visitor is expected to maximize utility within the budget constraint, which can be expressed as follows:

$$\text{Maximize: } U(Q_M, V) \ldots \ldots \ldots (4)$$
$$\text{Subject to: } WL = Px\, Q_M + Po\, V \ldots \ldots \ldots (5)$$

Here, U is the consumer's utility, QM stands for the market good, V is the frequency of visits to a tourist site, W denotes the wage rate per hour, L represents labour hours, Px indicates the cost of the market good QM, and Po refers to the amount of money paid externally to the budget for visiting the sites. Although WL represents the visitor's source of money, people usually have multiple sources of income; for instance, many visitors are public sector employees who receive a set monthly salary.

Thus, for simplicity, this analysis treats WL as total monetary income, represented by Y. Alongside travel and other out-of-pocket expenditures, the consumer must also take into account the opportunity cost for the period or hours (as previously stated) spent for recreational purposes at the sites. A customer's leisure time may have been used for any activity that brought in money. Thus, in maximization of consumer utility, the time-budget limitation may be represented symbolically as follows:

$$t = L + h.V \ldots \ldots \ldots (6)$$

Where 't' represents the overall household time available, 'h' denotes the time needed for the one-way round trip to a place, including time spent there, L signifies wage labour hours, and V indicates the frequency of visits to the sites. The problem of maximization is formulated as follows:

$$\text{Maximise: } U(QM, V)$$

Subject to: Wt = Px + [Po + W.h] V = Px. QM + PoV ... … (7)

Therefore, the cost of visiting a tourist destination includes transportation and out-of-pocket expenses, as well as wages lost from days spent travelling to and from the site and lodging there. The consumer then maximizes utility not constrained by paid working hours but by the overall amount of time available to the household, a concept referred to as the 'full income concept'.

Using constrained optimization to address this issue, the resulting demand function for visiting the site is expressed as: V = f (Px, Po, H, W), with t constant. The opportunity cost in this case is combined with other travel expenses (travel, local transportation, entry and tour fees, if applicable, meals and accommodation, etc.) for a round-trip to the location, which Po denotes. This makes the problem simpler; it may be expressed as:

Maximise: $U(Q_M, V)$
Subject to: $Y = P_x Q_M + P_oV$… … … (8)

Solving this formulation yields the Marshallian VDF as V = g(Px, Po, Y). The demand function implies that consumers' demand to visit a tourist site depends on the price of a visit, associated expenditures, household income, and other explanatory socio-economic factors (not explicitly mentioned here). V is only a function of Po for given Px and Y. Due to each site's unique ability to satisfy various visitor demands, the cost of visiting a substitute website is not taken into account in this approach.

Zonal TCM has been applied to estimate CS and the recreational use value of the Charaideo Maidams (CMs). First, using travel cost data, the Trip Generation Function (TGF) or visit demand function (VDF) was estimated. The TGF/VDF is estimated using Clawson's ZTCM. First, the 'zonal' visit rate for tourists from different zones was estimated, and this value was used to estimate the visit demand function.

Since the area under the derived demand curve with respect to average expenditure per single visit offers an assessment of the recreational value attained by an average tourist during their visit to the place of interest, it is extrapolated to the relevant visiting population to estimate the overall recreation benefits generated by the site in a specific year.

In order to ensure consistency of estimates, the 2-stage least squares (2SLS) regression method has been applied. Although the individual travel cost method includes all variables in equation (3), we estimated the demand function using zonal travel cost. We considered only six major explanatory variables based on their availability.

These were average total cost, PCNSDP (as a proxy for income), distance travelled, employment, educational qualification and age of the tourist. At first, regression of the visit rate on the logarithmic values of these explanatory variables was conducted to avoid inconsistency (equation 1). Subsequently, the actual visit rate (in equation 2) was replaced with the anticipated visit rate in order to evaluate consumers' recreation benefit from the consumer surplus by estimating the inverse demand function.

4.13 Trip Generation Function (TGF), and Recreation Benefit for Charaideo Maidams (CMs)

The TGF for CMs is estimated in the second stage and takes the following form:

For domestic tourists,

$LnATC = 12.80 - 0.57\widehat{LnVR}$; $R^2 = .88$, F = 1492.1 … (9)
Average $\widehat{LnVR}$ = 8.01, CS =18.22

For foreign tourists,

$LnATC = 13.61 - 3.806\widehat{LnVR}$; $R^2 = .75$, F =103.36 … (10)
Mean $\widehat{LnVR}$ = .762, CS = 1.10

Equations 9 and 10 show an inverse relationship between travel costs and visit rate for both domestic and international visitors, consistent with the law of demand.

Table 6. Regression Results of LnVisit Rate on Expl. Variables.

	Domestic			*Foreign*		
Variables	***B***	***t-value***	***p-value***	***B***	***t-value***	***p-value***
(Const)	17.73	17.39	.000	4.24	4.52	.000
LNATC	-1.07	-16.0	.000**	-.137	-3.30	.003**
LnPCNSDP	.054	.708	.480	.070	.844	.405
LnADT	-.53	-10.47	.000**	-.261	-1.71	.098
LnEmp	.30	3.47	.001**	.022	.085	.933
LnEdu	.34	2.48	.014**	.084	.165	.870
LnAge	.29	2.76	.006**	-.241	-1.26	.218
N = 203, R^2 = .900, Adj R^2 = .897, F = 294.330 (.000)				N = 37, R^2 = .605, Adj R^2 = .526, F = 7.645 (.000)		

Source: Calculation based on a sample survey in 2022.
Note: **, * significant at the 1% and 5% levels of significance, respectively.

The estimated consumer surplus per 100000 population for domestic tourists under CMs is INR 18.22 lakh, while the overall value is INR 8.31 lakh. Likewise, for foreign tourists, the total consumer surplus to be estimated is INR 1.1 lakh, while it is just INR 360.8 lakh considering all foreign visitors. This surplus represents the amount visitors/tourists are willing to pay beyond their actual cost to enjoy the recreational benefits of visiting the historical monuments. The total recreational value for domestic tourists is INR 230.13 lakh, and for foreign tourists is INR 26.5 lakh.

Table 7. Estimation of Recreation Benefit.

(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**[(5)*(6)]**
Tourist Site	Tourist Type	Choke Price (Lakh INR)	CS/Lakh Popu (Lakh INR)	CS/person (INR)	Total Visitor in 2021- 22	CS for all Visitors of 2021-22 (INR)
CMs	Domestic	3.60	18.22	18.22	45647	831688.3
	Foreign	8.16	1.10	1.10	328	360.8

Source: Author's calculation.

Table 8. Annual Recreation Benefit Generated in CMs.

(1)	(2)	(3)	(4)	(5)	[{(3)+(4)}*(5)]
Tourist Site	Tourist Type	CS/person (INR)	ATC/Person (INR)	Total Visitor in 2021- 22	Total Recreation Benefit (Lakh INR)
CMs	Domestic	18.22	5023.31	45647	230.13
	Foreign	1.10	80935	328	2654.70

Source: Author's calculation.

4.14 Willingness to Pay (WTP)

Various question formats are used in CVM. These include dichotomous choices, open-ended queries, iterative bidding, and payment cards, each with its own merits and demerits. They vary in application. To assess WTP for preserving and conserving the selected monument, the dichotomous choice form of CVM is used. The findings revealed that 96.07 percent of the sample expressed a desire to contribute financially to the preservation and better management of the site.

4.15 Estimation of Visit Demand Function (VDF) based on Willingness to Pay by 2SLS Method

Taking into account the additional WTP exhibited by the visitors beyond their current expenditure in terms of increased entrance fees, parking fees, and entertainment taxes, a distinct regression equation has been formulated for the site, resulting in the following revised demand function for domestic tourists:

$$LnWTP = 12.80^{*} - 0.57\ \widehat{LnVR}^{*}\ [R^2 = .89,\ \underline{R}^2 = .88,$$
$$(0.12)\ \ (0.015)\ \ldots\ (11)\ F = 1521.3,\ n = 203]$$

$$\text{Mean } \widehat{LnVR} = 8.01,\ CS = 18.23$$

The values within brackets denote the standard errors of the respective coefficients, and an asterisk (*) signifies that the coefficient is significant at the 1 percent level of significance by the two-tailed test.

The revised demand function for foreign tourists is as follows:

$$LnWTP = 13.61^{*} - 3.80\ \widehat{LnVR}^{*} \ldots\ldots\ldots (12)$$
$$[R^2 = .75,\ \underline{R}^2 = .74,\ F = 104.6,\ n = 37]$$

$$\text{Mean } \widehat{LnVR} = .762,\ CS = 1.102$$

It should be noted that the foreign visitors were only from 7 different destinations, viz., Bangladesh, Sri Lanka, Nepal, Bhutan, USA and Europe, which had wide variations in distances as well as travel expenditures and hence the result.

The revised consumer surplus for domestic tourists is estimated at INR 8.32 lakh. Thus, consumer surplus increases slightly by INR 456.47. This indicates that the visitors/tourists are willing to contribute more to Charaideo Maidams. However, many visitors are local day visitors and students, and most are reluctant to pay more and cannot afford it. On average, domestic visitors reported a willingness to contribute INR 35.06 for the site, in addition to the existing entry fee of INR 25/person per entry.

Estimated consumer surplus for foreign tourists is INR 361.46, with a negligible increment of only INR 0.66. However, WTP for the site is much higher for foreign visitors and also much higher than that of the average domestic tourist. This is primarily due to their significantly higher monthly incomes. On average, foreign tourists were willing to contribute INR 631.96 for the site, compared with the existing entry fee of INR 250/person per visit.

Table 11. Estimated Revised Recreation Benefit.

(1)	(2)	(3)	(4)	(5)	(6)
Tourist Type	Choke Price (Lakh INR)	CS/per Lakh Popu (Lakh INR)	CS/ person (INR)	Total Visitor in 2021- 22	CS for all Visitors of 2021-22 (INR) [(4)*(5)]
Domestic	3.61	18.23	18.23	45647	832144.81
Foreign	8.126	1.102	1.102	328	361.46

Source: Researcher's calculation using field survey 2022.

Using the total number of visitors, we estimate the total recreation benefit (CS) generated during 2021-22, as presented in Tables 12 and 13.

Table 12. Revised Annual Recreation Benefit.

Tourist Type	CS/person (INR) (1)	Total ATC/ Person (INR)	(Total ATC+WTP)/ Person (INR) (2)	Total Visitor in 2021- 22 (3)	Total Recreation Benefit (Lakh INR) [{(1)+(2)}x(3)]
Domest	18.23	5023.31	5058.37	45647	2317.32
Foreign	1.102	80934.86	81566.82	328	267.54

Source: Author's calculation.

Table 13. Overall Gain in Recreation Value.

Tourist Site	Estimated Surplus Generated (Lakh INR)		Surplus as per WTP (Lakh INR)		Expressed Variation (Lakh INR)	
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
CMs	230.13	26.54	231.73	26.75	1.6	0.21
Total	256.67		258.48		1.81	

Source: Author's calculation.

Table 13 shows that the overall annual recreation benefit of domestic and foreign tourists combined was about INR 256.67 lakh, which could increase to INR 258.48 lakh if the maximum WTP of visitors is capitalized, i.e., an increase of about INR 1.81 lakh. Moreover, developing tourism infrastructure at these sites may yield numerous Additional benefits in diverse forms.

As a result, the actual benefits that can be generated from the sites can be extended well beyond the currently estimated recreation surplus. If resources allocated for tourism development are well managed, this study reveals substantial potential to increase these benefits, ultimately enhancing the welfare prospects of the individuals associated with them.

5 DISCUSSION

North-East India is one of the world's most enchanting repositories of vibrant culture and rich historical heritage. The magnificent historical monuments display splendid architecture and carry a profound legacy of its cultural richness. With North-East India's natural beauty and the government's efforts to preserve cultural heritage, tourism has seen modest growth in footfall from across the country, though foreign visitors remain limited. Sivasagar is a renowned historical place in North-East India, showcasing unique archaeological and engineering marvels in the form of temples, stone bridges, tanks, and pyramid-like Maidams.

The individual travel cost analysis suggests that, among socio-economic factors, age is inversely related to visit rate. At the same time, education and income have positive impacts, as these factors enhance the urge to visit outside, especially with family members, among government employees. Travel distance increases difficulty by raising travel time and overall cost, and thus adversely affects the visit rate. This is also found to be true in the case of zonal travel cost analysis. In general, visitors are willing to contribute to heritage preservation, reflecting existence value, and willingness to pay for preservation was higher among higher earners with quality jobs.

The present study thus provides important guidelines for preserving this unique heritage site to support sustainable tourism. However, it may be noted that this study focuses solely on recreational values, overlooking the other components of "Total Economic Value", like non-use values. Thus, the overall benefit of the site would be much higher.

6 CONCLUSION

In this study, we examined how socio-cultural factors influence tourists' visit rates to the UNESCO historical cultural sites of Charaideo Maidams in North-East India. Findings show that tourists' monthly income strongly influences visit frequency, while long-distance travel and higher expenses adversely affect visit rates.

Using ZTCM, the study estimated visit demand functions and computed recreation benefits for domestic and foreign tourists. In conclusion, because this study captures only the recreational value of the selected site, the site's total economic value is much higher. Therefore, proper policies need to be implemented to ensure sustainable maintenance of such sites, which will also have significant positive impacts on the local economy.

Several respondents also visit this site alongside other neighbouring sites as part of a compact tour. Future studies may focus on the benefits of package tours. Overcrowding can also damage tourist sites, and this may be taken into account when computing the real contribution of tourism. Studies may thus be extended to include option and vicarious values of different natures.

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CRediT author statement

Term	Definition	Author 1
Conceptualization	Ideas; formulation or evolution of overarching research goals and aims	x
Methodology	Development or design of methodology; creation of models	x
Software	Programming, software development; designing computer programs; implementation of the computer code and supporting algorithms; testing of existing code components	x
Validation	Verification, whether as a part of the activity or separate, of the overall replication/ reproducibility of results/experiments and other research outputs	x
Formal analysis	Application of statistical, mathematical, computational, or other formal techniques to analyze or synthesize study data	x
Investigation	Conducting a research and investigation process, specifically performing the experiments, or data/evidence collection	x
Resources	Provision of study materials, reagents, materials, patients, laboratory samples, animals, instrumentation, computing resources, or other analysis tools	
Data Curation	Management activities to annotate (produce metadata), scrub data and maintain research data (including software code, where it is necessary for interpreting the data itself) for initial use and later reuse	x
Writing - Original Draft	Preparation, creation and/or presentation of the published work, specifically writing the initial draft (including substantive translation)	x
Writing - Review & Editing	Preparation, creation and/or presentation of the published work by those from the original research group, specifically critical review, commentary or revision – including pre-or post-publication stages	x
Visualization	Preparation, creation and/or presentation of the published work, specifically visualization/ data presentation	x
Supervision	Oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team	x
Project administration	Management and coordination responsibility for the research activity planning and execution	x
Funding acquisition	Acquisition of the financial support for the project leading to this publication	

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