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S3 Accredited SK No. 72/E/KPT/2024S5

Journal page is available to <https://jurnal.untag-sby.ac.id/index.php/jmm17/index>

Impact of Tourism on Household Welfare in Madura: An Analysis with Propensity Score Matching

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ARTICLE INFO

Article history:

Received: 24 January 2024

Revised: 30 April 2024

Accepted: 2 september 2024

Available online 2024

Keywords: [Key word heading]

Tourism attraction;

Propensity Score Matching;

Household welfare

IEEE style in citing this

article: Refiansyah Tri

Kusuma,

MohtarRasyid,(2024) "

"Impact of Tourism on

Household Welfare in

Madura: An Analysis

with Propensity Score

Matching", vol. 11, no. 2,

pp. 95-101.

ABSTRACT

This study aims to investigate the impact of tourism on household welfare in tourist attraction areas. The study employs Propensity Score Matching (PSM) quantitative analysis as an alternative method to assess the effect of tourism on non-food expenditure among households residing near tourist attractions

compared to those residing elsewhere. Secondary data from Susenas is utilized for this analysis. The findings indicate that households near tourist attractions exhibit higher non-food expenditures compared to those living farther away. This spending pattern correlates with increased household income, suggesting an improvement in welfare among households in tourist areas. Thus, these results suggest a positive contribution of tourism to household welfare in Madura

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1. Introduction

The economic development of a country is shaped by multiple factors, among which tourism plays a crucial role. Tourism contributes significantly to economic growth [1]. In 2017, Indonesia witnessed a rise in foreign tourist arrivals, resulting in favorable developments within the tourism sector. This positioned Indonesia as the second most visited destination in ASEAN, surpassing regional competitors like Vietnam. This growth aligns with increased foreign exchange earnings from tourism, enhanced rankings in the tourism competitiveness index, and a higher contribution of the tourism sector to Indonesia's GDP [2].

Tourism plays a pivotal role in enhancing the regional economy of East Java as it continues to develop across the province. According to findings from research [3], the tourism industry significantly bolstered East Java Province's gross domestic product (GDP) over the years, contributing 17.30% in

2013, 17.14% in 2014, 17.46% in 2015, and 17.76% in 2016. These figures underscore the sector's substantial and increasing economic impact, reflecting its growing importance in regional development strategies. The economic benefits derived from tourism extend beyond direct GDP contributions. They include job creation, infrastructure development, and the stimulation of related sectors such as hospitality, transportation, and retail. As tourism flourishes in East Java, local communities benefit from increased employment opportunities and income generation. Moreover, the influx of tourists stimulates demand for local products and services, thereby fostering entrepreneurship and supporting small businesses. Tourism development in East Java also promotes cultural preservation and environmental conservation. Efforts to showcase local heritage and natural attractions not only attract visitors but also instill pride in local communities and encourage sustainable practices.

The tourism sector holds significant promise for Indonesia's economy given its archipelagic nature. One of the notable islands in East Java is Madura Island, situated across the Madura Strait which links the Java Sea and the Bali Sea. Research [4] highlights Madura Island's considerable tourism potential, attributed to its natural beauty, cultural richness, and distinctive local traditions. Beginning from its northern tip in Sumenep Regency, renowned for its picturesque island tourism, to Pamekasan Regency with its historical sites (including palaces), Sampang Regency with its beaches, and Bangkalan Regency with its religious tourism offerings, Madura Island's attractions are gaining recognition among the public. Improved accessibility to Madura's tourist spots is facilitated by the Suramadu Bridge and flight connections from Surabaya to Sumenep, further enhancing its appeal to visitors.

Based on research conducted by [5] states that tourist visits have a positive and significant effect on community welfare.

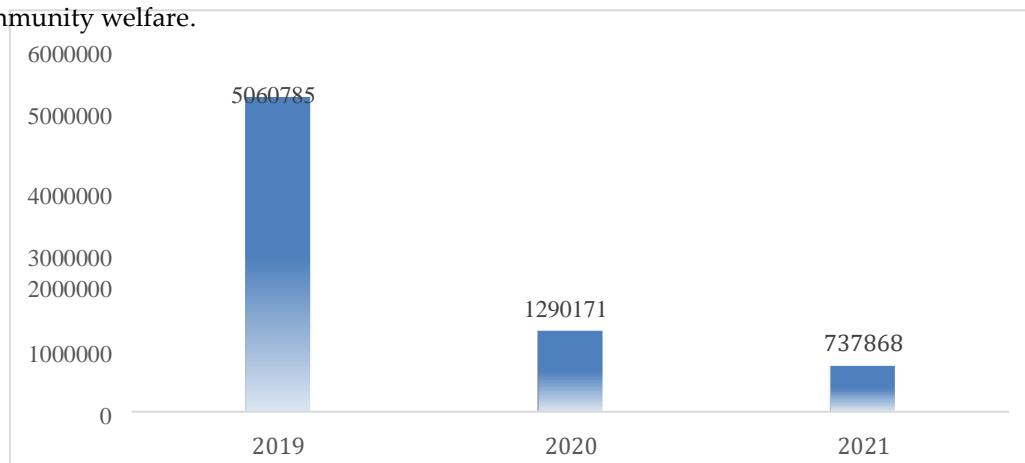


Figure 1. Number of Tourists in Madura

Source: BPS and Public Data, 2023

However, according to data on tourist numbers from the four districts of Madura Island, there were 5,037,048 visitors in 2019, which decreased to 1,240,497 in 2020 and further to 862,478 in 2021, indicating a decline attributable to the COVID-19 pandemic. This decline has significant implications for local communities that rely on tourism as a cornerstone of their economic activities [6], impacting the income of small businesses operating in these areas [7]. The earnings of business operators in the tourism sector indirectly influence community expenditures and welfare levels.

Welfare refers to the satisfaction derived from consuming the income earned. However, the extent of welfare is subjective, contingent upon the satisfaction derived from consumption. The connection between welfare and needs lies in the fulfillment of these needs, which contributes to a person's prosperity, as the fulfillment of these needs is closely associated with indicators of welfare.

According to [8], the indicator used to assess changes in welfare is the consumption pattern, categorized into two groups: household expenditures on food and non-food items. Data from the East Java Central Bureau of Statistics reveals that the average expenditure across the four districts of Madura

Island was 1.27 million in 2019, 1.19 million in 2020, and 1.20 million in 2021 [9]. The fluctuation in average household expenditure in Madura reflects the variations in welfare experienced during the Covid-19 pandemic.

An essential aspect in assessing the influence of tourist attractions is analyzing household expenditures. This aligns with the induced effect, a significant multiplier effect where economic activity changes due to household spending from income derived directly or indirectly from tourism [10]. Household expenditure serves as a crucial gauge of community economic welfare. Studying how tourist attractions affect patterns of household expenditure provides valuable insights into the economic impact of the tourism industry in Madura.

Previous studies have extensively investigated the influence of tourism on community welfare, as demonstrated by research conducted by [11] and [12], which employed qualitative descriptive methods to broadly examine this impact. However, there remains a scarcity of studies utilizing Propensity Score Matching (PSM) analysis techniques to assess the effects of specific programs or activities. Therefore, this study diverges from prior research by focusing on the impact of tourism on household welfare, particularly in terms of non-food expenditures. Consequently, the aim of this study is to ascertain how tourism contributes to the welfare of households residing in tourist attraction areas.

2. Method

This research employs quantitative methodology. According to [13] quantitative descriptive research involves analyzing data by describing or explaining collected data without aiming to make overarching conclusions or generalizations.

This study utilized secondary data, which, as defined by [13] refers to information sourced indirectly through other parties' data, documents, etc. Numerical data can be processed using mathematical formulas and analyzed using statistical methods. Specifically, data for this study were derived from the National Socio-Economic Survey (Susenas) dataset pertaining to Madura Island (Bangkalan, Sampang, Pamekasan, Sumenep). The research sample comprises 3,116 households from a population totaling 1,023,440 households in Madura.

This study employs propensity score matching (PSM) to analyze the data. PSM constructs statistical comparison groups by modeling the likelihood of program participation based on observed characteristics that are not influenced by the program itself. Participants and non-participants are subsequently matched according to their propensity scores using various methods detailed below. [14].

The Average Treatment Effect on the Treated (ATT) represents the expected mean difference between the treatment group receiving the intervention and the control group that does not receive it, expressed by formula[14].

$$\tau_{ATT} = E(Y_{1i}|D_1 = 1) - E(Y_{0i}|D_1 = 1)$$

τ_{ATT} : potential mean difference between groups

$E(Y_{1i}|D_1 = 1)$: Expected outcomes for households located around the tourist attraction, observable.

$E(Y_{0i}|D_1 = 1)$: Potential outcomes for households not in the tourist attraction area, unobservable.

The formula $E(Y_{1i} | D_1=1)$ represents the potential outcome for households residing in areas without tourist attractions, which cannot be observed. In the context of ATT, $E(Y_{0i} | D_1=1)$ denotes the potential outcome for households in the treatment group (those with tourist attractions) if they did not receive the treatment (i.e., if there were no tourist attraction), also unobservable due to its counterfactual nature. To calculate ATT, it is necessary to estimate $E(Y_{0i} | D_1=1)$, which serves as a substitute value. One approach involves using the potential outcomes of households not located in tourist attraction areas, specifically $E(Y_{0i} | D_1=1)$, as these outcomes are not simultaneously observed when households receive the intervention.

According to [15] , the initial step in employing the Propensity Score Matching (PSM) method involves selecting the model and its variables for estimating the propensity score. The model selection is intended to discern the scores and attributes distinguishing between households in tourist destination areas (the treatment group) and those not in such areas (the control group). These scores are determined to ensure that both groups exhibit equal average propensity scores across all utilized characteristics.

This study incorporates three variables: the dependent variable, which differentiates households located in tourist attraction areas from those not in such areas; the outcome variable, which is household non-food expenditure; and a control variable representing household expenditure, also referred to as household non-food expenditure, which influences the outcome.

The probit regression model was employed in this study. Probit regression is suitable when the dependent variable is categorical. This model was selected because the dependent variable in this study is categorical, with values coded as follows: 0 for households not located in tourist attraction areas and 1 for households in tourist attraction areas.

The dependent variable used in this study is denoted by the symbol of tourist attraction, representing households located in tourist attraction areas versus those not located in such areas. The control variable pertains to characteristics influencing household welfare in relation to tourist attractions, namely:

Table 1. Variable Definitions

Control Variables	Type of Variable	Variable Definition
<i>Family</i>	Nominal	Number of families living in
<i>Power</i>	Dummy	0 = PLN with meter 1 = PLN without meter 2 = Not Electricity
<i>Fuel</i>	dummy	0 = LPG 1 = Kerosene 2 = Firewood
<i>Wall</i>	Dummy	0 = Wall 1 = Bamboo 2 = Wood

The equations used in this study are as follows:

$$tourist\ attraction = \beta_0 + \beta_1 family + \beta_2 power + \beta_3 fuel + \beta_4 wall + e$$

In this study, probit regression aims to compute the propensity scores for each value distribution of the x variables characterizing two groups, rather than assessing the impact of unobserved variables on the dependent variable. The initial output generates scores for each sample within the two groups based on observed x variables. These scores are then used to compare the average propensity score between the two groups with similar characteristics.

The second step involves establishing common support, a critical aspect in propensity score matching as it defines the range of scores where matches can be found between treated and control groups. Common support is essential because without overlap in propensity score distributions, finding suitable matches becomes improbable, rendering the analysis invalid. It ensures that comparability can be achieved between treatment and control groups by verifying overlap in their score distributions.

Additionally, the Average Treatment Effect on the Treated (ATT) measures the average difference in potential outcomes between the treatment group exposed to the intervention and the same group under a counterfactual scenario where no treatment is administered. ATT elucidates the impact of treatment by comparing outcomes for households situated in tourist attraction areas with and without exposure to treatment.

3. Results and Discussion

Data was sourced from Susenas, representing the Madura Island region. The sample encompasses four districts: Bangkalan, Sampang, Pamekasan, and Sumenep. Cross-sectional data from 3,116 households includes both those situated in tourist attraction areas and those that are not, as depicted in Table 1.

Table 1. Number of Samples

treatment=tourist attractions	Freq.	Percent	Cum.
0	3015	96.76	96.76
1	101	3.24	100.00
Total	3116	100.00	

According to Table 1, there are 3,015 households categorized as 0, indicating they are not situated in tourist attraction areas. Conversely, only 101 households are categorized as 1, indicating they are in tourist attraction areas. This categorization accounts for 100% of the total sample of 3,116 households.

Table 2. Regression Results of Probit Model

Touristattractions	Coef.	St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
Family	.117	.056	2.09	.037	.007	.227	**
Power	-.418	.151	-2.77	.006	-.713	-.123	***
Fuel	.036	.016	2.28	.023	.005	.068	**
Wall	-.105	.04	-2.62	.009	-.184	-.026	***
Constant	-1.59	.201	-7.92	0	-1.983	-1.196	***
Mean dependent var	0.032		SD dependent var		0.177		
Pseudo r-squared	0.031		Number of obs		3116		
Chi-square	27.742		Prob > chi2		0.000		
Akaike crit. (AIC)	873.643		Bayesian crit. (BIC)		903.865		
*** $p<.01$, ** $p<.05$, * $p<.1$							

Note: the common support option has been selected

The region of common support is [.00652338, .10325262]

Based on Table 2, which employs probit regression, four control variables demonstrate significance at a p-value < 0.05. Consequently, these variables will be utilized to score and compare between the two treatment groups: households situated in tourist attraction areas and households not situated in tourist attraction areas.

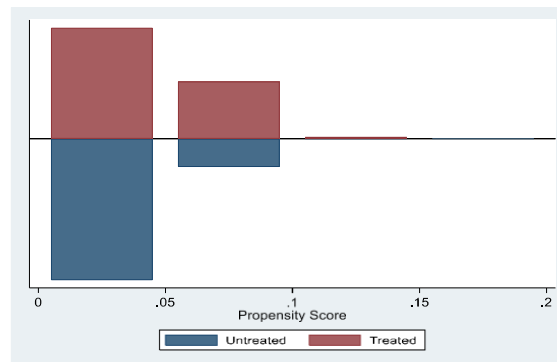
**Figure 1. Common Support**

Figure 1 illustrates some overlap in propensity scores between the treatment and control groups, indicating successful matching between them. Several observations were excluded due to being outside the common support region defined by the four control variables under investigation.

Table 3. Results of Estimation Average Treatment Effect on the Treated (ATT)

n. treat.	n. contr.	ATT	Std.Err.	t
101	2464	0.254	0.092	2.769

Based on the ATT value in Table 3, there is a 25.4% difference in non-food expenditure between households in the treatment group (101 households in tourist attraction areas) and the control group (households not in tourist attraction areas), which is statistically significant at $t = 2.769$. This finding aligns with research [16], suggesting that households leveraging tourism potential tend to achieve greater prosperity compared to those that do not. Specifically, the study indicates that monthly financial expenditure is higher among households that harness tourism potential than those that do not.

One of the significant anticipated impacts of tourism industry development is its potential economic benefits that can enhance community prosperity [17]. These findings demonstrate that the presence of tourist attractions can positively impact households residing in tourist areas. The establishment of business opportunities for households is among the positive outcomes, providing additional income and potentially creating new jobs for residents currently unemployed. There exists a robust and positive correlation between tourism and income, indicating that greater involvement in tourism activities or employment within the tourism sector contributes to improved welfare levels [18].

4. Conclusions

This study reveals that households in tourist attraction areas exhibit higher non-food expenditures compared to those outside such areas. The observed increase in household spending patterns correlates with higher household incomes, thereby enhancing welfare levels within the tourist attraction areas. These findings suggest a positive contribution of tourism to household welfare in Madura.

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