

Market Awareness and Marketing Constraints among Non-timber Forest Product Collectors in Jungle Mahal, West Bengal

Bipul Paul ¹, , Nilanjana Das Chatterjee ¹

1. Department of Geography, Vidyasagar University, Midnapore, IND

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Abstract

Non-Timber Forest Products (NTFPs) constitute a crucial income source for forest-dependent communities throughout India. While NTFP value chains, market structures, and institutions have been studied extensively, primary collectors' market knowledge and marketing constraints have received comparatively little attention. The significance of this gap is particularly relevant to the Jungle Mahal area of West Bengal, wherein tribal and forest-dependent households earn significant income and secure their livelihood from NTFPs. This study examines the market awareness of NTFP collectors and the significant constraints to NTFP marketing in the region. Primary data were collected from 560 NTFP collectors in 32 villages through a structured questionnaire. Data were analyzed using descriptive statistics, Analysis of Variance, and chi-square tests to explore variations in market awareness according to socio-economic groups, as well as key constraints to marketing. The findings show that there are significant differences in market awareness across income groups and ethnic communities, with the biggest difference observed among NTFP income groups. Collectors who earned higher NTFP incomes had better awareness about market prices, buyers, quality standards, value-addition opportunities, and market destinations. Respondents reported several major issues with their marketing experience, which included insufficient market and grading information, limited capacity to add value, adverse pricing processes, reliance on intermediaries, poor formal marketing channels, and a lack of storage facilities. This study adds to the existing literature on NTFP-based livelihoods in this socio-economically disadvantaged and forest-dependent region with empirical evidence. The results highlight the importance of better communication of market information, training in value addition, and grading, institutions based on cooperative marketing, proper application of minimum support price mechanisms, and better storage facilities for fairer and sustainable participation of NTFP collectors in market systems.

Categories: Marketing and Market Issues in Business, Sustainable Marketing, Regional studies

Keywords: non-timber forest product, constraints, market awareness, jungle mahal region, west bengal

Introduction

Non-Timber Forest Products (NTFPs) have attracted attention in the areas of development, conservation, and livelihood due to their contributions to rural incomes, food security, and sustainable resource use ([Magry et al., 2024](#)), ([Rasul et al., 2008](#)), ([Ros-Tonen and Wiersum, 2005](#)), and ([Suleiman et al., 2017](#)). NTFPs in many developing countries are an important livelihood resource for communities dependent on forest resources, providing subsistence benefits, together with additional income streams ([Gurung et al., 2021](#)), ([Mukul et al., 2015](#)), ([Paumgarten, 2005](#)), and ([Suleiman et al., 2017](#)). NTFPs play a vital role in the rural economy of India, especially among tribal and forest-dependent populations, which represent a significant contribution toward household incomes and also contribute to employment generation and

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revenues of the forest sector (Acharya, 2023), (Rasul et al., 2008). NTFPs are also considered a social safety net during times of agricultural uncertainty, seasonal unemployment, and economic distress beyond their economic value (Acharya, 2023), (Pierce and Emery, 2005), and (Shackleton and Shackleton, 2004).

While NTFPs are crucial, their economic potential has not yet been fully harnessed by collectors because they often encounter considerable hurdles in obtaining market access and fair returns. According to existing literature, NTFP markets have low bargaining power among collectors, dependence on intermediaries, inadequate infrastructure, limited value-addition opportunities, and insufficient institutional backing (Ahenkan and Boon, 2010), (Giri, 2024), (Hazari et al., 2025), (Magry et al., 2023), and (Rasul et al., 2008). These limitations are connected, rather than isolated. Poor transportation and storage facilities elevate collectors' reliance on local traders while limited access to market information hampers their ability to bargain for prices and locate other marketing channels. As a result, a substantial share of the economic returns generated in NTFP value chains is typically captured by intermediaries rather than actual collectors (Rasul et al., 2008) (Saxena, 2003).

Following Information Asymmetry Theory, where market inefficiencies arise when a certain group has greater access to information than others. NTFP markets often involve traders, intermediaries, and buyers who generally possess better knowledge regarding market prices, quality standards, product demand, and value-addition opportunities than collectors. These asymmetries reduce the bargaining power of collectors as well as strengthen their dependence on intermediaries. Hence, market awareness becomes a critical determinant of market participation and livelihood outcomes. Tracking market awareness among collectors thus sheds valuable light on the persistence of marketing constraints within forest-based economies.

Information-related constraints are essential in NTFP marketing systems. However, many collectors possess limited knowledge regarding prevailing prices, quality standards, market destinations, and government support mechanisms (Giri, 2024), (Hazari et al., 2025), (Magry et al., 2023), and (Verma and Paul, 2016). Failure to recognize these constraints leads to low participation through formal marketing channels and diminishes the effectiveness of such policy remedies as the Minimum Support Price (MSP) scheme (Acharya, 2023), (Hazari et al., 2025), and (Shukla et al., 2022). Moreover, dependence on traders as the primary source of market information creates imbalances in power distribution that can also facilitate exploitative marketing practices (Giri, 2024) (Magry et al., 2023). These results indicate that market awareness is not just a feature of individuals, but also plays a significant role in livelihood and market performance.

Previous work on NTFP value chains, market structure, and institutional setup has been largely done but relatively little has been researched about the market behavior of primary collectors, and their challenges when participating in NTFP markets (Pasaribu et al., 2021), (Rasul et al., 2008), and (Shackleton et al., 2007). Existing research mostly examines larger marketing systems, or policy interventions at the macro level, and empirical evidence of collector-level awareness, information knowledge, and perceived obstacles to marketing has been very scarce. Moreover, the literature based on the Jungle Mahal region of West Bengal is limited, as local tribal communities and forest-dependent communities rely heavily on NTFPs. As a result, vital aspects remain, including how well collectors understand the market, the central constraints they face related to marketing, and what interventions are necessary to maximize their active participation in the market.

The Jungle Mahal region is a relevant context for considering these questions. Marked by extensive forest cover, a large tribal population, and persistent socio-economic marginalization, the region has a high dependence on forest resources for livelihood security (Chatterjee et al., 2025) (Mandal et al., 2021). NTFPs contribute critically to household incomes and the sustainability of local livelihoods, and yet collectors encounter structural, informational, and institutional barriers that limit their economic benefits from the forest products generated. Designing efforts that address these challenges are crucial for achieving equitable and sustainable livelihoods based on NTFPs. Against this background, the present study seeks to (i) determine the socio-economic factors associated with market awareness among NTFP collectors in the Jungle Mahal region; (ii) identify the marketing constraints affecting the collection and sale of NTFPs; and (iii) examine the interventions and strategies perceived by collectors as necessary for improving market participation and marketing outcomes.

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Research Method

Study area

The study was undertaken in the Jungle Mahal region of West Bengal, India, which comprises parts of the Jhargram, Purulia, Bankura, and Paschim Medinipur districts (Figure 7). The area has extensive forest land and high concentrations of tribal and forest-based communities. Jungle Mahal is one of the socio-economically marginalized regions of the state, where agriculture and forest-based activities provide the main sources of livelihood for rural households (Chatterjee et al., 2025) (Mandal et al., 2021). The region is host to several tribal communities, among whom are the Santhal, Munda, Lodha, Bhumij, Kora, Oraon, and Birhor; a large proportion of people directly depend on forest resources for food and income generation. Despite agriculture being an important part of the economy, seasonal unemployment, low productivity, and limited livelihood opportunities increase dependence on NTFPs (Dinda et al., 2020) (Chatterjee et al., 2025). The collection, processing, and sale of NTFPs offer further income to their inhabitants and are a critical safety net for their lives, especially during lean farming periods and times of low prosperity.

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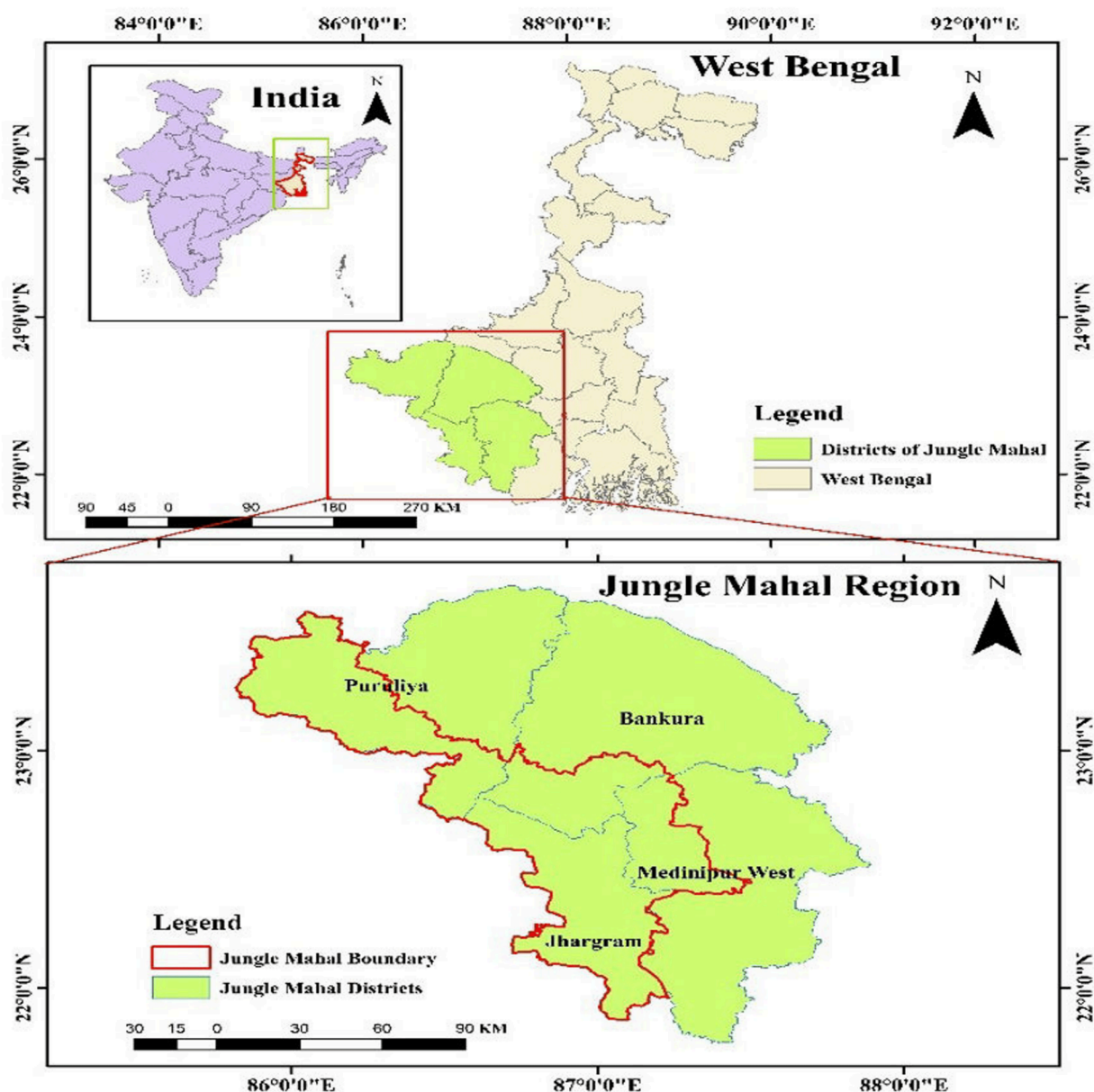


FIGURE 1: Location map of the Jungle Mahal

Source: Created by the authors using ArcGIS

Note: The location map of the study area was prepared using ArcGIS 10.8. Administrative boundary data for West Bengal districts and Community Development Blocks were obtained from publicly available government spatial datasets. The map was projected using the World Geodetic System 1984 (WGS 84) coordinate reference system. Spatial data were cross-checked with official administrative records to ensure consistency and accuracy in representing the study area boundaries.

They possess numerous forest resources in Jungle Mahal, which are diverse and rich (including sal leaves, kendu leaves, mahua flowers, sal seeds, tamarind, honey, medicinal plants, and other forest products), and can be sources of income for collectors of NTFPs. These are significant household products, and they also provide employment for the rural population. Collectors, as key economic users of NTFPs, are exposed to challenges in terms of market access, price realization, availability and storage, transportation, and institutional support that pose significant obstacles and reduce

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their role in market systems and the potential benefits provided by forest resources. Given the prevalence of forest-based livelihood dependence in the context of an extensive tribal population in the region and chronic challenges to the market and livelihoods, the region is a suitable setting to investigate the extent to which NTFP collectors recognize potential markets and navigate existing barriers to market access. Knowledge of these issues is an important means of creating policies and interventions to improve livelihoods, increase market opportunities, and contribute to a more just and equitable development of communities reliant on forests.

Sampling and data sources

The study was carried out in the Jungle Mahal region of West Bengal, India. Nine Community Development (CD) Blocks were selected for the study: Jhargram, Binpur II, and Nayagram from Jhargram district, Bagmundi and Bundwan from Purulia district, Ranibandh from Bankura district, and Midnapore, Salboni, and Garbeta III from Paschim Medinipur district. These blocks were purposively selected because they contain some of the greatest concentrations of forest-dependent households and show high levels of involvement in NTFP collection, processing, and marketing activities. Households that were collecting essential NTFP products, notably sal leaves (*Shorea robusta*), kendu leaves (*Diospyros melanoxylon*), mahua flowers (*Madhuca longifolia*), sal seeds, as well as other economically relevant forest products for at least six months of the year were eligible for inclusion in the study. In addition, the chosen blocks represent the major forested areas in the four districts of Jungle Mahal and contribute to the guarantee of a well-representative geographical area, reflecting the differences in the socio-economic and market situations of NTFP collectors. A multistage stratified random sampling method was used to obtain a representative sample of NTFP collectors across the Jungle Mahal region. At the first stage, 32 villages with a great dependence on forest resources were identified using preliminary field surveys and local community consultation before the study was concluded, with the aim of ensuring substantial NTFP collection participation. During the second stage, households in the chosen villages were stratified based on ethnicity and dominant occupation. Next, 560 respondents chosen randomly from among these strata were included in the study. Using a multistage sampling design, respondents were clustered in villages and administrative blocks. Such clustering could create similar observations within groups. However, this sampling strategy was used to provide sufficient representation in terms of geography for forest-dependent communities throughout the Jungle Mahal area and, as such, the results are used to reflect that context. The primary data were obtained through household interviews that collected information on respondents' socio-economic characteristics, access to agriculture-related information, employment trends, other forms of income, and forest-based livelihood options. Various methods of data collection, including household surveys, direct field observations, focus group discussions, and key informant feedback, were used. We conducted extensive fieldwork for a complete comprehension of the study site and to collect a comprehensive perspective of the NTFP collectors' livelihood and marketing conditions. The survey instrument was inspired by the existing literature on NTFP marketing, market awareness, and livelihood studies (Rasul et al., 2008), (Shackleton et al., 2007), and (Magry et al., 2023). Afterward, the survey questionnaire was further validated and refined in a pilot survey to ensure the clarity, relevance, and comprehensibility of the survey questions before data collection started.

Data collection

The data for this study were obtained from January 2023 to September 2024 in the Jungle Mahal region of West Bengal state of India. Prior to data collection, the necessary ethical approvals from the respondents and the university ethics committee were obtained. Prior to the final primary data collection, a preliminary field survey was used to approach several stakeholders and collect first-hand demographic and socio-economic information about the study region. During the reconnaissance survey, the researcher approached NTFP collectors with the help of local village heads and NGOs, while accompanying them to ensure that he knew the NTFP collectors and that there was no reluctance among participants to take part in the study; this helped in the smooth conduct of primary data collection. Before the extensive data collection procedure, a preliminary research study was conducted to test the survey questions prior to the extensive primary data collection. After the pilot study, the survey questions were revised and a few questions which were not suitable for the present study were deleted, and some more questions were included. A total of 600 potential respondents were approached during the field survey. Of these, 560 respondents completed the survey, resulting in a response rate of 93.3%. The remaining respondents either declined to participate or provided incomplete responses and

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were therefore excluded from the final analysis. The survey was conducted using a properly structured questionnaire, which served as the main instrument for data collection. The primary data were collected from 560 respondents in 32 villages covering all nine administrative blocks of the study area. The field interviews were conducted in person at the respondents' residences or community hubs to maintain a natural environment. To ensure clarity and cultural sensitivity, the sessions were conducted in the local language (Bengali or Santhali), with researchers reading the structured questions aloud for participants with limited literacy and obtaining informed consent through verbal agreement or thumbprints in the presence of witnesses. Informed consent was obtained from all participants before data collection. Participation was voluntary, and respondents were assured of confidentiality and anonymity.

The interview process followed a systematic sequence, beginning with the collection of socio-economic data, followed by Likert-scale assessments of market awareness, and concluding with open-ended discussions regarding marketing constraints and suggestions. For qualitative data obtained from open-ended responses and interviews, a thematic analysis approach was employed. Responses were systematically reviewed and coded into meaningful units. Similar responses were grouped into broader categories through an inductive coding process. This resulted in the identification of 14 major challenge themes and 19 suggestion themes. The coding process involved initial open coding, followed by grouping into axial categories to capture recurring patterns and key issues reported by respondents.

Data analysis

The collected data were analyzed using both descriptive and inferential statistical techniques. Market awareness was measured using a five-point Likert scale covering key dimensions, including awareness of market prices, buyers, quality standards, value addition, and final market destinations. The internal consistency of the awareness scale was assessed using Cronbach's Alpha, which yielded a value of 0.919, indicating excellent reliability. Similarly, the challenges scale recorded a Cronbach's Alpha value of 0.709, demonstrating acceptable reliability. To examine differences in awareness levels among respondent groups, a one-way Analysis of Variance (ANOVA) was performed. Subsequently, the continuous awareness scores were transformed into a binary variable using the overall mean score as the cut-off point. Respondents scoring below the mean were categorized as "Low Awareness," whereas those scoring at or above the mean were classified as "High Awareness." This dichotomized variable was then employed in cross-tabulation analyses to construct contingency tables and examine associations between awareness levels and other key socio-economic and market-related variables.

Chi-squared (χ^2) tests were then performed to identify statistically significant associations between variables within these tables. The strength of any significant association was quantified using Cramér's V (ϕ_c) (Zar, 1999). Finally, descriptive statistics (frequencies and percentages) were calculated using Microsoft Excel to explore constraints faced by respondents, their existing sources of market knowledge, and the initiatives suggested to eliminate market constraints. The quantitative data were analyzed using IBM SPSS (version 26) Statistics.

Results And Discussion

Results

Awareness Level by Socio-Economic Groups

This subsection presents the descriptive statistics and one-way ANOVA results from Table 7, showing the total awareness score across different socio-economic groups. The ANOVA indicates that the mean awareness score differs significantly across several groups, while remaining similar for others.

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Group	Count	Awareness score (mean)	Standard deviation	Min	Max
Gender					
Female	309	12.2	3.78	13	22
Male	251	13.01	3.95	17	22
Ethnic groups					
Bhumij	60	14.43	3.67	6	22
Lodha	31	11.22	3.25	5	17
Munda	106	14.85	2.5	7	18
Non-ST	89	11.68	3.86	7	22
Santal	274	11.71	3.93	7	22
Education Group					
Below 1	232	12.6	3.72	5	20
1 to 4	242	12.56	3.67	5	20
More than 4	86	12.51	4.76	7	22
Age group					
Below30	117	12.98	4.33	6	22
30-50	423	12.42	3.75	5	22
More than 50	20	13.3 0	3.41	8	20
NTFP Income Group					
Less than 1000	147	9.02	4.05	6	22
10000-150000	129	11.56	2.59	6	20
More than 15000	284	14.86	2.43	5	18

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TABLE 1: Descriptive statistics for total awareness score by socio-economic groups

Source: Based on primary data collected by the authors

ANOVA results revealed significant differences in market awareness across NTFP income groups, ethnic groups, and gender (Table 2). The strongest variation was observed among NTFP income groups ($F = 195.9365$, $p < 0.001$), with awareness increasing alongside NTFP income. Significant differences were also found among ethnic groups ($F = 20.644$, $p < 0.001$), with the Munda (mean = 14.858) and Bhumij (mean = 14.433) communities reporting the highest awareness scores, followed by the Santal (11.718), non-ST (11.685), and Lodha (11.225) groups. Gender differences were also significant ($F = 5.9284$, $p = 0.0152$), as males (mean = 13.011) exhibited higher awareness than females (mean = 12.213). In contrast, no significant differences were observed across education ($F = 0.0188$, $p = 0.9814$) or age groups ($F = 1.3238$, $p = 0.267$), indicating that market awareness was largely unaffected by these factors.

Cross-tabulation of Awareness by Socio-economic Groups (Chi-Square)

Variable	df	F-value	p-value
Gender	1	5.9284	* 0.0152
Ethnic groups	4	20.644	** <0.001
Education	2	0.0188	0.9814
Age	2	1.3238	0.267
NTFP Income group	2	195.9365	** <0.001

TABLE 2: ANOVA results for awareness score across socio-economic groups

df, degrees of freedom; ANOVA, Analysis of Variance; NTFP, Non-Timber Forest Product

This subsection presents the results from Table 3, which examines the association between socio-economic groups and categorical awareness (Yes/No) using the chi-square (χ^2) test. The analysis reveals a highly significant association between awareness and the "NTFPs Income Group" ($\chi^2 = 318.8843$, $p = 0.000$). The strength of this association is very strong, as indicated by a Cramer's V of 0.7546. A clear positive relationship is visible, with the percentage of respondents who were aware ("Yes") increasing directly with income: 10.20% for the "Less than 10000" group, 66.66% for the "10000 - 15000" group, and 95.77% for the "More than 15000" group.

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	Awareness				
	No n (%)	Yes n (%)	χ^2	Cramér's V	p-value
NTFPs Income Group					
Less than10000	132(89.79)	15(10.20)	318.8843	0.7546	**<0.001
10000 - 15000	43(33.33)	86(66.66)			
More than 15000	12(4.22)	272(95.77)			
Gender					
Female	112(36.24)	197(63.75)	2.245	0.0633	0.134
Male	75(29.88)	176(70.11)			
Education Group					
Below 1	92(39.65)	140(60.34)	3.9356	0.0838	0.1398
1 to 4	13(50)	13(50)			
More than 4	92(30.46)	210(69.53)			
Ethnic groups					
Bhumij	10(16.66)	50(83.33)	46.5255	0.2882	**<0.001
Lodha	13(41.93)	18(58.06)			
Munda	13(15.09)	90(84.90)			
Non-ST	13(43.82)	50(56.17)			
Santal	13(47.08)	145(52.91)			
Age Group					
Below 30	41(35.04)	76(64.95)	1.6453	0.0542	0.4393
30 to 50	156(36.87)	267(63.12)			
More than 50	10(50)	10(50)			

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TABLE 3: Cross-tabulation of awareness by socio-economic groups

Source: Based on primary data collected by the authors

A significant association was also found for "Ethnic groups" ($\chi^2 = 46.5255$, $p = 0.000$), with a moderate strength of association (Cramer's $V = 0.2882$). The Munda (84.90% "Yes") and Bhumij (83.33% "Yes") groups showed the highest levels of awareness. This was followed by the Lodha (58.06%), non-ST (56.17%), and Santal (52.91%) groups.

Conversely, and in contrast to the ANOVA results for mean scores, no statistically significant association was found between categorical awareness and "Gender" ($\chi^2 = 2.245$, $p = 0.134$). Similarly, no significant association was found for "Education Group" ($\chi^2 = 3.9356$, $p = 0.1398$) or "Age Group" ($\chi^2 = 1.6453$, $p = 0.4393$), which aligns with the ANOVA findings.

Challenges Faced by NTFPs Collectors for Marketing

Table 4 summarizes the marketing challenges faced by NTFP collectors in the Jungle Mahal region. For ease of interpretation, the discussion combines the "Critical" and "Severe" categories to identify the most serious constraints.

Lack of market and grading knowledge emerged as the most severe challenge, with 99.1% of respondents (105 critical and 450 severe) rating it as either critical or severe. This was followed by unfavorable or fixed prices in formal channels (97.0%; 80 critical and 463 severe). Other major challenges included the dominance and exploitation by middlemen (85.4%), inadequate value addition and processing capacity (79.5%), and weak formal marketing channels (75.2%).

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Challenges	Critical Challenge	Severe Challenge	Moderate Challenge	Minor Challenge	Not a Challenge
(Number of respondents)					
Dominance and Exploitation by Middlemen	138	340	43	1	38
Low Remuneration	54	246	183	66	11
Inadequate Value Addition/Processing Capacity	77	368	111	3	1
Poor Transportation Systems	43	180	153	160	24
Indebtedness and Forced Quick Sale	53	310	152	38	7
Prevalence of Barter System	8	22	99	362	69
Collusion and Institutional Undermining	12	94	416	35	3
Weak Formal Marketing Channels	70	351	120	15	4
Absence of Clear NTFP Policy	1	4	22	454	79
Lack of Adequate Storage Facilities	52	270	123	97	18
High Transaction Costs	42	189	235	83	11
Distance to Formal Markets	46	215	206	84	9
Bureaucratic Inefficiencies	45	211	209	86	9

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Cheating in Measurement and Weights	3	10	434	103	10
Unfavorable or Fixed Prices in Formal Channels	80	463	13	3	1
Lack of Market Information and Grading Knowledge	105	450	3	1	1

TABLE 4: Perceived challenges by respondents

Source: Based on primary data collected by the authors. NTFP, Non-Timber Forest Product

Indebtedness and forced quick sale (64.8%), lack of adequate storage facilities (57.5%), and low remuneration (53.6%) were also identified as important constraints. In contrast, cheating in measurement and weights and collusion and institutional undermining were most commonly perceived as moderate challenges. The absence of a clear NTFP policy and the prevalence of the barter system were generally viewed as minor or non-existent challenges by most respondents.

Respondent Suggestions for Policy and Intervention

This subsection reports on respondent suggestions for policy and intervention, as detailed in Table 5. There was overwhelming support for several key interventions. The highest level of agreement was for Redefine the Role of Tribal Development Cooperative Corporation (TDCC)/Large-Sized Adivasi Multipurpose Societies (LAMPS) (496 "Yes" votes, 88.6%), followed closely by Establish and Enforce MSP (487 "Yes" votes, 87.0%) and Disseminate Real-Time Market Information (478 "Yes" votes, 85.4%). A strong desire for transactional security was also evident, with Ensure Direct and Immediate Cash Payment receiving 463 "Yes" votes (82.7%).

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Suggestions	Yes n (%)	No n (%)
Disseminate Real-Time Market Information	478 (85.4%)	82 (14.6%)
Redefine Role of TDCC/LAMPS	496 (88.6%)	64 (11.4%)
Ensure Direct and Immediate Cash Payment	463 (82.7%)	97 (17.3%)
Establish and Enforce MSP	487 (87.0%)	73 (13.0%)
Promote Direct Govt./NGO Procurement	421 (75.2%)	139 (24.8%)
Make Processing Tools Accessible	394 (70.4%)	166 (29.6%)
Provide Training in Value Addition	331 (59.1%)	229 (40.9%)
Promote Micro/Cottage Industries	418 (74.6%)	142 (25.4%)
Mandate Transparency in Transactions	274 (48.9%)	286 (51.1%)
Establish Local Storage Centers	349 (62.3%)	211 (37.7%)
Strengthen Financial Support	403 (72.0%)	157 (28.0%)
Allow Free Trade with Safeguards	259 (46.3%)	301 (53.7%)
Promote Collective Organizations	352 (62.9%)	208 (37.1%)
Conduct Micro-Level Resource Mapping	415 (74.1%)	145 (25.9%)
Improve Transportation Infrastructure	256 (45.7%)	304 (54.3%)
Extend Procurement Period	319 (57.0%)	241 (43.0%)
Create Community-Managed Storage	382 (68.2%)	178 (31.8%)
Incentivize Cultivation on Private Land	295 (52.7%)	265 (47.3%)
Modernize Local Markets	304 (54.3%)	256 (45.7%)
Formalize Collector Groups (FPOs)	370 (66.1%)	190 (33.9%)

TABLE 5: Respondent suggestions for policy and intervention

Source: Based on primary data collected by the authors. TDCC, Tribal Development Cooperative Corporation; LAMPS, Large-Sized

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Support was also strong for interventions aimed at systemic and financial strengthening. This included promoting Direct Government/NGO Procurement (421 “Yes”), promoting Micro/Cottage Industries (418 “Yes”), conducting Comprehensive Micro-Level Resource Mapping (415 “Yes”), and strengthening Financial Support (403 “Yes”). Interventions related to infrastructure and community empowerment also received majority support, including making Processing Tools Accessible (394 “Yes”), creating Community-Managed Storage (382 “Yes”), formalizing Collector Groups (FPOs/Cooperatives) (370 “Yes”), promoting Collective Organizations (352 “Yes”), and establishing Local Storage Centers (349 “Yes”).

Findings from Qualitative Interview Data

The qualitative analysis identified several recurring themes that explain the underlying socio-economic challenges faced by NTFP collectors (Table 6). The most prominent theme was the lack of market information, reported by 79.5% of respondents, which significantly limits their ability to make informed selling decisions. A substantial proportion of respondents (75.0%) highlighted their dependence on middlemen, not only for marketing but also as a source of informal credit.

Additionally, 71.1% of respondents emphasized the need for immediate cash payments, which drives their preference for local traders over formal procurement systems. Issues related to low bargaining power (66.4%) further reinforce this dependency. Gender-based constraints were also evident, with 53.8% of respondents indicating that women are largely excluded from price negotiation processes.

Furthermore, more than half of the respondents (51.3%) expressed distrust toward cooperative institutions due to delayed payments and bureaucratic inefficiencies. Storage limitations and perishability of NTFPs were reported by 57.5% of respondents, often leading to distress sales.

These findings highlight that beyond structural constraints, behavioral and institutional factors play a crucial role in shaping market participation among NTFP collectors.

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Theme	Description	Frequency (n)	Percentage (%)
Dependence on Middlemen	Reliance on intermediaries for selling NTFPs and credit	420	75.0
Immediate Cash Needs	Preference for instant cash payments over delayed formal systems	398	71.1
Lack of Market Information	Limited knowledge of prices, buyers, and market structure	445	79.5
Low Bargaining Power	Inability to negotiate fair prices	372	66.4
Gender-Based Constraints	Women excluded from market negotiation processes	301	53.8
Distrust in Cooperatives	Negative experiences with LAMPS/TDCC (delays, bureaucracy)	287	51.3
Storage and Perishability Issues	Lack of storage leading to distress sales	322	57.5

TABLE 6: Themes derived from qualitative interview data

Source: Based on primary data collected by the authors. TDCC, Tribal Development Cooperative Corporation; LAMPS, Large-Sized Adivasi Multipurpose Societies; NTFP, Non-Timber Forest Product

Furthermore, the interviews uncovered a significant gender-based disparity in bargaining power; female collectors reported that they are often excluded from direct negotiations with larger traders, remaining relegated to the collection and primary sorting stages. Respondents also voiced a psychological barrier toward formal cooperatives (LAMPS), citing previous experiences with delayed payments and complex bureaucratic procedures as primary reasons for their continued reliance on the unorganized market. These qualitative insights explain the "why" behind the statistical correlations found in the survey data, particularly regarding the low awareness levels among marginalized ethnic groups.

Discussion

Awareness Levels and Socio-Economic Determinants

ANOVA and chi-square results in the study confirm that the lack of market awareness is a critical issue that is deeply rooted in the socio-economic structure of the collecting communities. The robust finding that awareness scores increase significantly alongside NTFP income peaking in the highest income group, strongly validates the premise that market knowledge is a prerequisite for financial success in this sector. This is further supported by the highly significant association between categorical awareness and the NTFP income group ($\chi^2 = 318.8843$). Magry et al. (Magry et al., 2023) noted that high market awareness is critical for the NTFP sector's economic potential. Conversely, Magry et al. (Magry et

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al., 2023) highlighted that collectors with minimal awareness have limited bargaining leverage, hindering their ability to secure better earnings. Supporting this, Magry et al. (Magry et al., 2023) and Hazari et al. (Hazari et al., 2025) both noted that the market awareness level of the collectors is negatively affected by the distance of the market from the village.

The study reveals that males have a significantly higher mean awareness score than females (mean = 13.011 vs. mean = 12.213). Magry et al. (Magry et al., 2023) noted that this disparity exists because, while women constitute the majority of collectors, their role is often confined to the primary collection stage, whereas men frequently handle the trade aspect. This restricted engagement in downstream activities limits women's access to market information (Magry et al., 2023). Although the categorical awareness analysis found no significant association with sex in sample, the lower mean score among women confirms that their depth of knowledge is functionally insufficient for maximizing returns.

The comparatively higher awareness among Munda and Bhumij communities may be associated with stronger participation in NTFP marketing activities, greater interaction with traders and community networks, and better access to institutional support mechanisms. Although these factors were not directly measured, they provide plausible explanations consistent with previous studies.

These results reveal that NTFP collectors have minimal or no market information about the upper-level stakeholders of the NTFP market chain. They are totally unaware of the cost-benefit arrangements between the upstream stakeholders in the market chain. The male collectors and those who have only primary-level education have very little knowledge about market structure. The main reasons behind this limited knowledge are that women play the collector role in NTFP collection, and their role remains missing further up the market chain. All the traders are primarily men, and they collect NTFPs directly from households, so there is an information gap between the collectors and the actual market scenario. Prior studies have revealed that education level is a key driver of market awareness (Loaiza et al., 2015). Some studies have also highlighted that inadequate knowledge and awareness are major concerns of collectors (Marshall et al., 2006) (Shackleton et al., 2007). Lack of information about the market, prices of NTFPs, and poor transport facilities are the main causes of low monetary benefits from NTFPs (Jha, 2016) (Belcher et al., 2004). Market information is a major component of obtaining greater economic benefits from NTFPs.

Marketing Challenges Faced by NTFPs Collectors

The financial returns to the NTFP collectors are highly impacted by various levels of constraints in the marketing of NTFPs. The most significant constraint they face is the monopoly of traders and intermediaries over price fixation. This limits the scope for greater returns to the collectors. Lack of good transportation, high transport costs, and poor road connectivity play a significant role in traders' monopoly because these constraints restrict the direct connection of collectors to the market. As a result, the small traders and intermediaries visit the villages to purchase the NTFPs at the prices they fix for NTFPs.

The collectors' perceptions of marketing challenges clearly indicate that their primary struggle is systemic economic exploitation rooted in information scarcity. The identification of Lack of Market Awareness and Grading Knowledge (99.1% critical/severe) and Unfavorable or Fixed Prices in Formal Channels (97.0% critical/severe) as the most severe impediments confirms the core problem of information asymmetry. Shrivastava (Shrivastava, 2024) found a similar problem in Chhattisgarh, where 96 per cent of respondents pointed out the low and fluctuating market price of NTFPs as their main issue.

The severe rating for Dominance and Exploitation by Middlemen (85.4% critical/severe) is a direct result of this lack of information. Giri (Giri, 2024) observed that local middlemen exploit tribal collectors by offering low prices, and often use dishonest methods such as underweighting, delayed payments, and manipulation of quality standards (Giri, 2024) to maximize profits. Consequently, primary collectors receive only 10 to 33 per cent of the product's final retail price (Rasul et al., 2008). The high severity rating for Inadequate Value Addition/Processing Capacity (79.5% critical/severe) limits profitability, as collectors are forced to sell raw produce (Giri, 2024). Acharya (Acharya, 2023) reported that value addition potential in many MFPs can be more than 300 per cent, but this potential is lost because processing units are hard to establish due to the lack of infrastructure (Giri, 2024) and specifically the unavailability of reliable electricity and water (Shukla et al., 2024).

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Several previous studies also highlighted the monopoly of traders and intermediaries as a major restriction in the marketing of NTFPs (Bhattacharya and Hayat, 2004) (Marshall et al., 2006). In Bangladesh, lack of proper transport vehicles, poor road connectivity, and transport costs are the major restrictions on NTFP marketing (Kar et al., 2012). Another study by Kumar et al. (Kumar et al., 2018) in Gujrat, India, reveals that traders' monopoly in price fixation is one of the significant problems in NTFP marketing. In general, the collectors collect the raw product and very less of them process it at the village level, so traders use these limitations in price fixing (Marshall et al., 2006). In the Indian perspective, several studies revealed that poor transportation facilities are key constraints faced by NTFP collectors (Awono et al., 2010) (Saha and Sundriyal, 2012). The market type and its structure can also influence the NTFP price, and some reports of various countries like South Africa, India, Mexico, and Bolivia reported this repeatedly (Mahapatra and Shackleton, 2012), (Saha and Sundriyal, 2012), (Shackleton et al., 2011), and (Velde et al., 2006). Some studies conducted by Malleson et al. (Malleson et al., 2014) in Ghana, Cameroon, and Nigeria mentioned the impact of external market forces on NTFP prices. Thus, the problem of NTFP marketing and the factors responsible for it have been pointed out by various researchers, but no action has been taken to overcome the issues. NTFPs have a vast potential for improving the livelihoods of poor forest dwellers and tribes, so there is an urgent need to promote a framework or mechanism to overcome such obstacles to ensure that collectors can earn the maximum profit from these products.

The need for Instant Cash Payment drives the issue of Indebtedness and Forced Quick Sale (64.8% critical/severe). Collectors prefer immediate cash from local traders over government mechanisms where payments are delayed due to the DBT system (Shukla et al., 2022). Furthermore, the lack of "Adequate Storage Facilities" (57.5% critical/severe) is a pervasive issue (Giri, 2024), also noted by Shrivastava (Shrivastava, 2024), leading to significant post-harvest losses.

According to the findings the collectors generally did not perceive the Absence of Clear NTFP Policy (95.2% minor/not a challenge) as a major issue. This suggests that while a policy framework (e.g., FRA 2006) (Acharya, 2023) exists, the core problem is weak implementation and enforcement (Giri, 2024). Similarly, the Prevalence of Barter System (77.0% minor/not a challenge) was not a primary concern, although Magry et al. (Magry et al., 2023) observed that the barter system is still often used by traders to take advantage of collectors.

Suggestions Given by Respondents

The respondents' suggestions for policy prioritize institutional interventions that offer immediate economic stability and transparency.

The highest priorities identified were institutional mechanisms to guarantee fair returns: "Establish and Enforce MSP" (87.0% support), and "Redefine the Role of TDCC/LAMPS" (88.6% support). MSP schemes are centrally sponsored to ensure fair returns for MFPs (Acharya, 2023), yet Hazari et al. (Hazari et al., 2025) noted that the unavailability of MSP was a critical constraint in Tripura, and Shukla et al. (Shukla et al., 2022) and Acharya (Acharya, 2023) reported that awareness about MSP is very low.

The demand to "Ensure Direct and Immediate Cash Payment" (82.7% support) directly addresses the obstacle created by delayed DBT payments associated with government procurement (Shukla et al., 2022). Furthermore, the strong support for promoting "Micro/Cottage Industries" aims to increase local value addition, which Giri (Giri, 2024) noted is crucial for generating employment, particularly for women and youth. A significant finding is the lack of majority support for the suggestion to "Improve Transportation Infrastructure" (256 "Yes", 304 "No"). This contradicts research consistently listing poor transportation as a major constraint (Shrivastava, 2024) (Hazari et al., 2025). The low prioritization suggests that collectors view guaranteed institutional and financial solutions (like MSP and instant cash) as more immediate and achievable alternatives to long-term physical infrastructure development, confirming the primacy of the economic exploitation challenge over the physical logistics challenge in their experience.

Limitations and Future Research Directions

Despite providing important insights, this study has certain limitations. The analysis is based on cross-sectional data collected from selected blocks of the Jungle Mahal region, which may limit the generalizability of the findings to other regions. Additionally, the reliance on self-reported responses may introduce response bias.

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Future research could adopt longitudinal approaches to examine changes in market awareness over time and assess the long-term impact of policy interventions. Comparative studies across different forest regions and value chain analyses would further enhance understanding of NTFP commercialization and livelihood outcomes.

Conclusions

It is further evidenced that socio-economic factors, especially NTFP income, ethnicity, and gender, have a strong impact on market awareness among NTFP collectors in the Jungle Mahal region. The results show that scarcity of market information, intermediation, insufficient capacity for value addition, and limited institutional support limit collectors’ capacity to obtain fair returns from NTFP marketing. The research contributes to the literature by indicating that market awareness is also one of the key factors linked to the socio-economic characteristics of forest-dependent communities and their participation in the market. Methodologically, it integrates quantitative and qualitative methodologies aiming to understand the empirical drivers of market awareness and constraints faced by collectors. The results indicate that addressing collector welfare needs far more than conventional market reforms. The priority should be placed on improving mobile-based market information systems, encouraging tribal producer companies and women's cooperatives, decentralizing procurement services, promoting value-addition training, and ensuring the efficient implementation of MSP schemes. Improving economic access to the digital market and developing community-based marketing institutions can reduce the burden of intermediaries on collectors and strengthen their bargaining power. At the same time, this would lead to more equitable participation in NTFP markets and secure incomes for forest-dependent communities.

Appendices

Appendix

The appendix includes Tables 7-13, which present the reliability test results, item-level reliability statistics for the market awareness and challenges scales, socio-economic profile, market awareness questions, marketing challenges, and suggested initiatives, respectively.

Scale	Number_of_Items	Valid_Cases_Used	Cronbach_Alpha	Interpretation
Awareness	5	560	0.919	Excellent Reliability
Challenges	16	560	0.709	Acceptable Reliability

TABLE 7: Summary of reliability test

Scale	Item	Item_Total_Correlation	Alpha_if_Item_Deleted
Awareness	Awareness_Market_Price	0.734	0.913
Awareness	Awareness_Buyers	0.833	0.899
Awareness	Awareness_Quality_Standards	0.812	0.897
Awareness	Awareness_Value_Addition	0.865	0.885
Awareness	Awareness_Final_Destinations	0.771	0.906

TABLE 8: Item analysis and reliability statistics for the market awareness scale

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Scale	Item	Item_Total_Correlation	Alpha_if_Item_Deleted
Challenges	Dominance and Exploitation by Middlemen	0.428	0.642
Challenges	Low Remuneration	0.383	0.65
Challenges	Inadequate Value Addition/Processing Capacity	0.557	0.638
Challenges	Poor Transportation Systems	0.172	0.685
Challenges	Indebtedness and Forced Quick Sale	0.333	0.658
Challenges	Prevalence of Barter System	-0.277	0.727
Challenges	Collusion and Institutional Undermining	0.141	0.678
Challenges	Weak Formal Marketing Channels	0.304	0.662
Challenges	Absence of Clear NTFP Policy	-0.398	0.715
Challenges	Lack of Adequate Storage Facilities	0.359	0.654
Challenges	High Transaction Costs	0.435	0.642
Challenges	Distance to Formal Markets	0.411	0.646
Challenges	Bureaucratic Inefficiencies	0.433	0.642
Challenges	Cheating in Measurement and Weights	0.209	0.673
Challenges	Unfavourable or Fixed Prices in Formal Channels	0.551	0.649
Challenges	Lack of Market Information and Grading Knowledge	0.6	0.746

TABLE 9: Item analysis and reliability statistics for the challenges scale**Research questionnaire****How to cite this article:**

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Variable	Response Options
Gender	Male; Female
Ethnic Group	Santhal; Munda; Lodha; Bhumij; Non-ST
Age Group	Below 30 years; 30–50 years; More than 50 years
Education Level	Below 1st Standard; 1st to 4th Standard; More than 4th Standard
Primary Occupation	Crop Cultivation; Forest-Based Resources (NTFP Collection)
Annual Income from NTFP (INR)	Less than 10,000; 10,000–15,000; More than 15,000

TABLE 10: Socio-economic profile

Market Awareness Domain	1	2	3	4	5
Market Prices: Knowledge of current prevailing prices.					
Buyers: Knowledge of potential purchasers/outlets.					
Quality Standards: Understanding quality requirements.					
Value Addition: Knowledge of processing/improving product.					
Final Destinations: Awareness of where products are sold.					

TABLE 11: Market awareness related questions

On a scale of 1 to 5 (1 = Very Low, 5 = Very High), please rate your level of awareness regarding:

Section C: Marketing Constraints

Please indicate the severity of each challenge you face in marketing your forest produce:

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No.	Marketing Challenge	Critical	Severe	Moderate	Minor	Not a Challenge
1	Middlemen and local trader domination					
2	Exploitation by intermediaries/ agents					
3	Deficit of detailed market information					
4	Lack of knowledge on current market trends					
5	Lack of knowledge regarding value addition					
6	Unawareness of quality/grading standards					
7	Inappropriate or unfavourable fixed prices					
8	High price fluctuations in local markets					
9	Delays in receiving payments (DBT issues)					
10	Unfair weighing practices by traders					
11	Absence of proper					

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	storage/wareho use					
12	High transportation costs to markets					
13	Poor road connectivity/iso lation					
14	Absence of alternative competitive buyers					

TABLE 12: Challenges related questions

Section D: Suggested Initiatives

Please indicate whether you believe these initiatives are necessary

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No.	Proposed Strategy / Initiative	Yes	No
	Policy & Price Regulation		
1.	Strict fixing and enforcement of Minimum Support Price (MSP).		
2.	Regular revision of MSP based on current market inflation.		
3.	Legal action against traders purchasing below the MSP.		
4.	Simplification of the forest transit permit process.		
	Institutional & Cooperative Reform		
5.	Revamping and redefining the role of LAMPS (Local Cooperatives).		
6.	Increasing the number of government procurement centres.		
7.	Inclusion of more NTFP varieties under formal procurement.		
8.	Promoting Self-Help Groups (SHGs) for collective bargaining.		
	Payment & Financial Support		
9.	Ensuring direct and immediate cash payments for produce.		
10.	Resolving technical issues and delays in DBT (Direct Benefit Transfer).		
11.	Provision of low-interest credit/loans to reduce middleman dependency.		

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	Information & Technology		
12.	Real-time electronic dissemination of market prices via SMS/Radio.		
13.	Establishment of digital kiosks in village centres for market trends.		
14.	Awareness campaigns regarding the final use/destination of products.		
	Infrastructure & Value Addition		
15.	Construction of state-sponsored warehouses/storage facilities.		
16.	Establishment of primary processing units (drying/sorting) at the village level.		
17.	Provision of modern tools for sustainable harvesting.		
18.	Regular training workshops on value addition and quality grading.		
19.	Development of better road connectivity to primary markets.		

TABLE 13: Questions related to respondents suggestion

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Acquisition, analysis, or interpretation of data: Bipul Paul, Nilanjana Das Chatterjee

Drafting of the manuscript: Bipul Paul, Nilanjana Das Chatterjee

Supervision: Bipul Paul, Nilanjana Das Chatterjee

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Concept and design: Nilanjana Das Chatterjee

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Data Availability Statements

The datasets (and/or code) supporting this study are available from the corresponding author upon reasonable request.

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