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Non-Timber Forest Products Collection Affects Education of Children in Forest Proximate Communities in Northeastern Pakistan

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Abstract: Non-timber forest products (NTFPs) are crucial in driving the economy of communities living inside or around forests. The scarcity of business and employment opportunities often push the forest proximate communities to tap a range of NTFPs for earning their livelihoods. In many forest-based communities around the world, children are actively involved in NTFPs collection, which is likely to affect the socioeconomic paradigms of these children. We aim to investigate how the NTFP collection venture affects the education of the children involved in the forest proximate communities of Azad Jammu and Kashmir (AJK), Pakistan. A stratified sampling followed by a series of focus group discussions and one-to-one interviews were carried out to collect information on collection behaviour, patterns, income generation, and other socioeconomic variables. We used a binary logistic regression model to explain children's state of attending schools using a range of socioeconomic variables. The empirical evidence showed that 42% of the NTFP-collecting children were not going to school, and nearly two-thirds were working in unfavourable working environments. The regression model showed that the role and behaviour of contractors, along with factors like household conditions, were important factors in employing children for long working hours. The study has implications for reforming policies regarding the nexus of income generation and education in the forest-based communities.

Keywords: forest proximate communities; forest-based communities; non-timber forest products; livelihoods; Azad Jammu and Kashmir; Pakistan

1. Introduction

Communities living inside or in the vicinity of forests are often dependent upon a range of natural products and services that forests have to offer [1,2]. Forest proximate communities (FPCs) often feature groups of indigenous people—mostly smallholder farmers—that are engaged in various forest-based enterprises [3]. Such FPCs utilise forest resources, including timber and non-timber forest products (NTFPs) for their household needs such as food, refuge, medicinal requirements, welfare, building materials, and cultural practices [4,5]. It is estimated that in the developing world about 60 million people rely on NTFPs for food security, medicines, infrastructure, raw material and, perhaps more importantly, to supplement monthly income [6–9].

In FPCs, NTFPs are often collected by children and women [10–13]. According to the International Labour Organization (ILO), globally, more than 60% of children working in the forestry, agriculture, and livestock sectors are 5 to 17 years old [14]. Often, children are accompanied by women who lead the NTFP collection venture. Evidence suggests that in many FPCs, especially those in the developing

parts of Africa and Asia, children often outweigh women in terms of sharing the outdoor workload [15]. The collected NTFPs are not only used for daily subsistence but are also sold in markets to generate fast cash [16,17].

About 90% of FPCs fall below the poverty line [18–21]. Poverty, coupled with harsh environmental conditions, drives children towards engagement in NTFP collection [22]. Supplementing household income is often the key motivation for children working in NTFP collection [23]. In the NTFPs enterprise, contractors have a pivotal role as they buy products from FPCs to sell in bigger markets. Very often, contractors see children as active, cheap, and readily available labour in FPCs and engage them in the collection activity. In many FPCs, however, the monetary incentive is not the only driver of child labour; the cultural practice of collecting NTFPs also has a significant role to play [24]. Such a practice has been reported in FPCs in different parts of the world where children and women are frequently involved in collecting and transporting NTFPs from forests as a cultural practice [25,26].

Although NTFP collection is critical for subsistence and nutrition, the venture involves several challenges for the children involved. A frequently reported disadvantage is that children often work under hazardous working conditions [27,28]. In this context, a rarely mentioned disbenefit is the compromise over education; the children are not able to attend school regularly due to collection activities [28,29]. Evidence suggests that in areas of high poverty, child labour becomes inevitable, which often leads to very poor indices of child education [30,31]. Although the role of children in NTFP collection is well documented, most of the studies in this niche only report children's collection behaviour, market chain, and ethnobotany of the NTFPs collected [32]. The effect of the NTFP collection activity on the socioeconomic paradigm of children—especially education—is mostly unexplored in many parts of the world [33].

Pakistan, due to its geographical location, consists of many biodiversity hotspots harbouring dense understory vegetation [34]. About 6000 species of flowering plants have been documented in the country, 2000 of which are frequently used as NTFPs. NTFP collection is a major economic activity in the FPCs of Pakistan [12,35,36]. The role of NTFPs in the economics of FPCs has been documented in some parts of Pakistan. For example, only from one location in the Palas Valley of Pakistan, 15,000 kg morels are exported both nationally and internationally, generating revenue of about 343,000 United States Dollar (USD) per year [37]. Due to the lack of market regulation and conservation information, the morel industry in Pakistan has not yet reached its full potential [38]. Furthermore, medicinal plants are the most frequently collected NTFPs in Pakistan; among all flowering plants in the country, about 12% of plants are being used as medicines nationally and internationally [35]. It was observed that 350–400 herbal medicine manufacturing companies and 350 homeopathic medicine companies are operating in Pakistan, making it one of the leading countries to export medicinal plants [39–41]. The present supply of NTFPs in Pakistan comes mostly from the harvesting of wild plant resources. Harvesting of these resources is mostly carried out in rural households and by women, children, and nomadic grazers [42].

The Hindukush and Himalayan mountain ranges in the Khyber Pakhtoon Khwa province and Azad Jammu and Kashmir (AJK) of Pakistan support a range of valuable NTFPs. The FPCs in this part of the world have extensive knowledge of the local forest plant species and the usage of these resources [43]. These people rely on inherited knowledge in the identification, storage, and utilization of the collected NTFPs. The most essential and abundant NTFPs obtained from these areas include medicinal resources, edible morels, fruits, nuts, and vegetables [44–46]. The collection methods are mostly based on traditional practices [45,47]. AJK in Pakistan has the majority of its area under forest cover and sustains a large population of FPCs. About 88% of its population inhabits rural areas that are located in or close to forests [48]. These rural communities are often not frequently connected with bigger cities. Thus, a lack of trade and employment opportunities pushes them to rely on many small ventures within the community, including NTFP collection [49]. Geo-economically, AJK is an important region since it was on the receiving end of a deadly earthquake in 2005 that heavily affected infrastructure, forests, and the FPCs living there and demised the economic activities in the region [50].

Since 2005, large-scale measures have been taken to restore the local infrastructure and local economy. In the context of the land use, recent catastrophic events, and economic vulnerabilities of the region, this study aims to contribute to the current literature with a detailed analysis of how the NTFP collection enterprise affects the socioeconomic paradigms of children in FPCs, especially the motivations and barriers to education.

2. Materials and Methods

2.1. Study Area

This study was conducted in two sites in AJK, Pakistan: Neelum Valley and Bagh District (Figure 1). Neelum Valley, the first of the two study sites, is the largest district of AJK located northeast to Muzaffarabad, the capital of AJK. The valley covers an area of 3737 km^2 and has an altitude between 1124–6129 meters. In Neelum Valley, the mean annual temperature ranges from −10.9 to 17.3 °C (Figure 2) while the mean annual precipitation is between 246–1048 mm. The second study site is the Bagh District, located in the western Himalayan foothills, south of Neelum Valley. It covers an area of 1368 km^2 (Figure 1) and has mean annual temperature and precipitation ranging from 2.3 to 21.6 °C and 333–1249 mm, respectively [51]. Due to their moist temperature climate (Figure 2), Neelum Valley and Bagh District are enriched with diverse temperate forests with a dense upper story dominated by conifers, while the understory vegetation harbours essential medicinal plants [52]. Furthermore, these forests are enriched with some endemic plants which make them an important ecosystem, both ecologically and economically [53] (Figure 2). Among the vegetation resources, there are valuable forests, herbs, and shrubs that have high commercial value, both in the local and international markets [54].

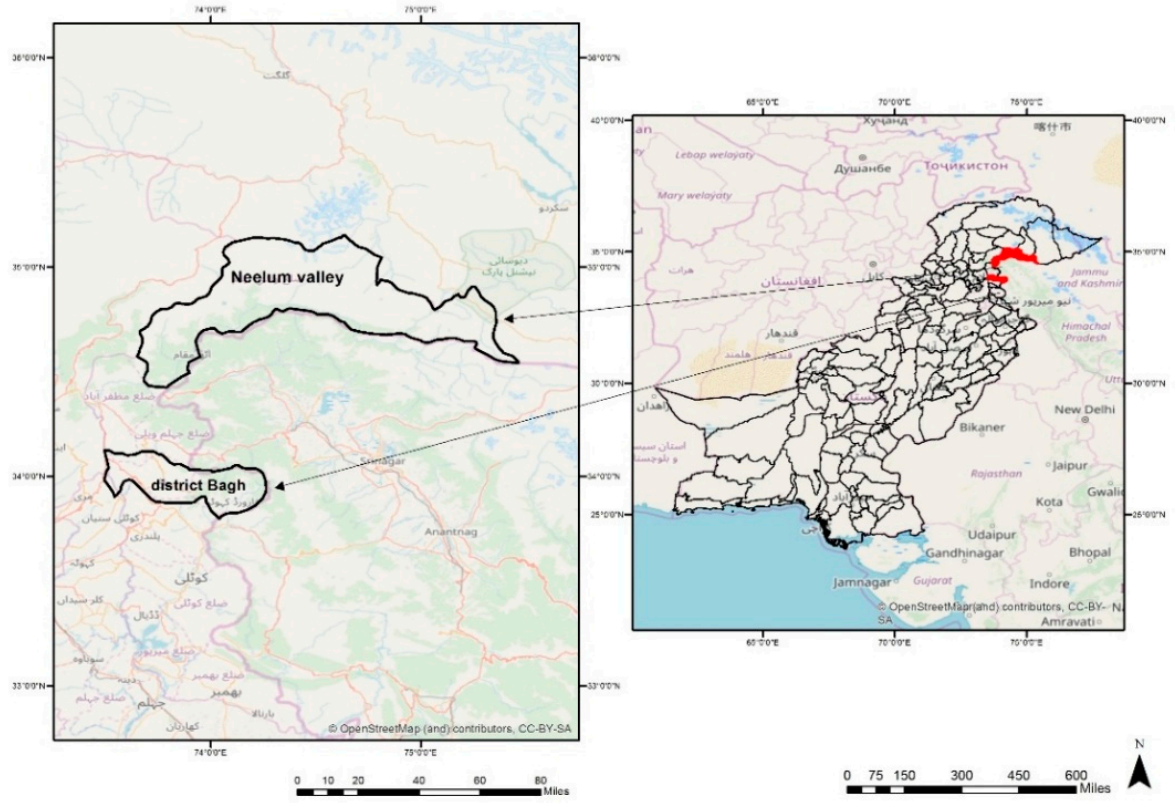

Figure 1. Map displaying the geographical location of the study area: Neelum Valley and Bagh District in Azad Jammu and Kashmir (AJK), *Pakistan*.

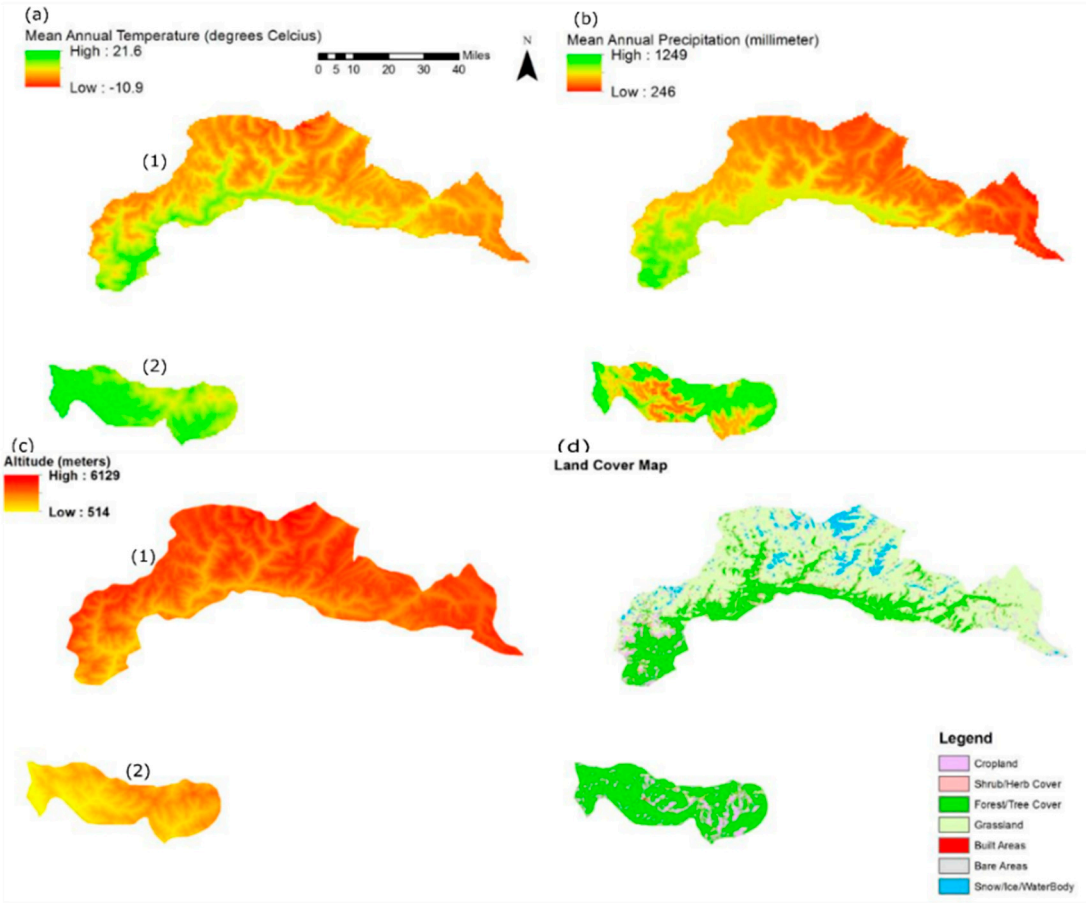

Figure 2. Topography, climatic conditions, and land cover of Neelum and Bagh in AJK. The climatic variables (**a**,**b**) were downloaded from www.worldclim.org. Altitude (**c**) was derived from the digital elevation model of NASA's Shuttle Radar Topography Mission (SRTM) at 30 m spatial resolution. The land cover map (**d**) is extracted from the "The European Space Agency Climate Change Initiative(CCI)" global land cover product (www.esalandcovercci. Org, 300 m spatial resolution). All figures were prepared in ESRI ArcGIS 10.6.

2.2. Methodological Approach

2.2.1. Season/Time of the Survey

The study was conducted at the onset of the fall season, during September–October 2017. The time of year to conduct this survey was crucial since the NTFP collectors are least likely to be available for interviews during the peak collection seasons—pre-monsoon (May–early June) and post-monsoon (late July–August).

2.2.2. Steps in Conducting Surveys

Step I. Liaising with the local forest department: First, we contacted the local forest department and had a discussion with the forest officers about site selection, structuring the questionnaire, and gaining insight into the socioeconomic and cultural dimensions of the NTFP collectors in general. We selected two villages in the Neelum Valley and one village in Bagh to survey the NTFPs households. These districts were most affected by a severe earthquake in 2005 which displaced people and destroyed most of the livelihood means for the local communities [55]. A forest department representative escorted us to key NTFP collectors in the selected sites who then acted as our guides or informants for the rest of the survey.

Step II. Liaising with local guides: We shared our plans, questionnaire, and the purpose of conducting the study with the informants in the selected villages and discussed with them the appropriate method and time to approach the NTFP collectors in the selected villages in the two study sites. The guides were helpful because they helped us to communicate in the local language, and the local community felt at ease in the presence of their community members accompanying us.

Step III. Individual interviews and focus group discussions with the NTFP collectors: The guides led us to the houses of a few of the NTFP collectors, and later other households were identified using the snowball sampling technique. Also called chain-referral sampling, the method relies on earlier respondents' help to identify and bridge the gap with other respondents [56]. This method has been used extensively as it helps to identify and approach the sample of a population which otherwise remains unexplored due to lack of local knowledge and various other socioeconomic and cultural barriers [57].

2.3. Population Sampling

We surveyed two villages in Neelum Valley and one village in Bagh to interview the NTFPs households. Despite involving the local guides, we could only survey a small number of respondents due to three primary reasons: First, the children were sceptic about the survey as they feared it to be a government campaign against over-harvesting of endangered NTFPs. Second, most of the children were hesitant to participate in the focus group discussions (FGDs) and individual interviews without the consent of their family heads. Third, some of the NTFP collectors were advised by their contractors to avoid sharing their collection information with anyone. Consequently, we interviewed a total of 60 respondents (children); 30 from each of the two study sites. On the recommendation of our informants, we conducted FGDs with 4–6 children in every village since the children were more comfortable answering questions in group meetings as compared to one-on-one interviews. Before inviting children into these FGDs, we ensured the consent of their parents for the activity. For quantitative data, a questionnaire was formulated, to determine the roles and involvement of respondents in relation to NTFPs. The questions asked in the questionnaire were both structured and semi-structured.

2.4. Organization of the Questionnaire and Data Analysis

The questionnaire assessed the involvement of interviewees in NTFP collection and how income and other parameters affect their schooling. The questionnaire consisted of three parts: In the first part, we recorded the demographic profile of the respondents (age, location, etc.). In the second part, we investigated their educational status (whether or not they attend school). The third part consisted of questions addressing the socioeconomic and cultural perspectives of the respondents. We solicited information on different socioeconomic aspects, including the demographic details of the respondents and the behaviour of the contractors with them.

A logistic modelling technique was applied to understand the relationship of education (likelihood of attending school) to the independent variables considered in this study. The survey data was entered into a Microsoft Excel spreadsheet and subsequently imported into the Statistical Package for Social Science (SPSS Inc., IBM Corporation, Somers, NY, USA) version 21. A binary logistic regression model was used to assess to what extent predictor variables such as monthly income, duration of being involved in NTFPs, wage satisfaction, employer behaviour, conditions of household, and monthly expenses affect children's schooling (response variable). The statistical transformation of the logistic regression is given by:

$$\text{Logit (pi)} = \text{Log (pi/ 1 } - \text{ pi)}$$

where pi denotes the probability of yes (attending school) and (1 − pi) is the probability of no (not attending school).

The empirical model that has been derived for the current research is Log (pi/ 1 − pi) = 0 + income + number of years in NTFP collection + wage satisfaction + expenses per month + contractor's behaviour + cosmopolites + economic condition of household. where, monthly income (in USD) had seven levels (0 = 0–50, 1 = 50–100, 2 = 100–150, 3 = 150–200, 4 = 200–250, 5 = 250–300, 6 = 300–500); number of years in NTFP collection had three levels (0 = 5 years, 1 = 10 years, 2 = more than 10 years); wage satisfaction had two levels (0 = satisfactory, 1 = unsatisfactory); contractor's behaviour had two levels (0 = equal treatment, 1 = biased treatment); expenses per month (in USD) had six levels (0 = 20–50, 1 = 50–70, 2 = 70–100, 3 = 100–130, 4 = 130–160, 5 = 160–200); cosmopolites had three levels (0 = rarely visit big cities, 1 = occasionally visit big cities, 2 = frequently visit big cities); and economic condition of the household had two levels (0 = satisfactory, 1 = unsatisfactory).

3. Results

The results suggest that the children living in and around the forests in the districts of Neelum and Bagh are actively involved in the collection of NTFPs. A large proportion of the interviewed children were not going to school due to engagement in NTFPs collection. The children were involved in NTFP collection to fulfil day-to-day necessities and generate fast cash. In total, 42% of the children did not attend school due to involvement in NTFPs collection, thus NTFP collection is a critical factor hampering child education in the study areas (Table 1).

Table 1. Background information and characteristics of the respondents.

Variable	Categories	Respondents (%)
Gender	Male	58.3
	Female	41.7
Condition of household	Unsatisfactory	81.7
	Satisfactory	18.3
State of attending school	Not going to school	42
	Going to school	58
Parental permission to attend school	Allowing	52.6
	Not allowing	47.4
Engagement in non-timber forest products (NTFPs) collection	Involved	96.7
	Not involved	3.3

3.1. Background Information and Characteristics of the Respondents

Table 1 shows the various socioeconomic characteristics of the respondents interviewed during the survey. More than half of the respondents (58.3%) were male; female respondents were found to be less actively involved in the NTFPs collection. When asked whether their monthly income was satisfactory or unsatisfactory (i.e., whether or not their monthly income was enough to meet their household needs), most of the respondents (81.7%) described their household economic condition as "unsatisfactory" (Table 1). Furthermore, the majority of the parents were hesitant to send their children to schools and instead preferred engaging their children in the NTFP collection activity (Table 1).

3.2. Involvement of the Respondents in NTFPs Collection

Our results suggest that 53.3% of the children involved in NTFP collection were involved in this venture for less than five years. The majority of the children worked alongside their families (83.3%) followed by those who worked for contractors individually (11.6%). In total, 60% of the children stated that they often worked in life-threatening steep terrains. Furthermore, 40% of the respondents reported that they worked for more than 12 h a day. These long working hours are common during the peak season of NTFPs collection. In off-peak seasons, children would often work for 4–5 h a day. Moreover,

44% of the children involved in NTFP collection would sell the collection to the contractors while the rest would sell it directly to nearby markets.

3.3. Socioeconomic Dimensions of NTFPs Collection

We assessed the impact of NTFP collection on the economic condition of respondents' households. The wages of NTFP-collecting children were not fixed; the salaries depend on collector's attributes such as physical strength and efficiency of collection. Overall, monthly incomes were very modest, often ranging from $100–$350 per month. The survey further revealed that 49% of the NTFP-collecting children would hand over their entire income to their parents to cater to family needs, without keeping a penny for their own expenses. The children agreed that their employers (the contractors) were treating them fine and 92% of the respondents were satisfied with the conduct of their employer (Table 2).

Table 2. Contractors' behaviour with the NTFP-collecting children.

Variable	Categories	Respondents (%)
Equity	Equal treatment	92
	Biased treatment	8
Criterion for selecting labour	None	56
	Physical vigour	20
	Experience	12
	Both physical vigour and experience	12
Labour preferences	Children	16
	Women	12
	Men	20
	Family	52
Pressure exerted by contractors to meet deadlines	Yes	40
	No	60

3.4. Empirical Findings Based on Logistic Regression

We used a logistic regression model with maximum likelihood evaluation using the Chi-squared test. The model assessed how the choice of attending school is affected by monthly income, the number of years in NTFP collection, wage satisfaction, contractor's behaviour, being cosmopolitan, and household conditions (Table 3). The maximum likelihood is a standard method that is often used to evaluate probability functions because the model results are concordant, asymptomatically efficient, and adequately distributed [58]. A total of seven variables were used in the binary logit regression model; out of these seven variables, five variables showed significant predictive contribution in the model. Monthly income, the number of years in NTFPs collection, wage satisfaction, being cosmopolitan, and the condition of the household were shown to be significant. Our results indicate substantial economic dependence of forest-based households on NTFP collection and suggest that the collection activity is a significant determinant of children's education in the surveyed households.

Among the significant independent variables, monthly income showed a positive relation (B = 0.45, Wald = 3.724, $p < 0.05$) with the dependent variable (i.e., the choice of attending school). The positive sign of beta shows that the children generating a good income from NTFP collection are more likely to attend a school. The duration of being involved in the NTFP collection business also shows a statistically significant predictive power (B = −1.347, Wald = 6.106, $p < 0.05$). The negative sign of the beta implies that children who are involved for less than five years are unable to spare time for school, whereas children working for longer are settled enough to find time for attending school alongside

NTFPs collection. The dissatisfaction of the wages (B = −1.581, Wald = 4.454, $p < 0.05$) shows a negative correlation with school attendance; the NTFP collectors who are satisfied with their wages are more interested in attending school.

The behaviour of contractors with the NTFP-collecting children showed a negative relationship with the likelihood of collectors going to school. The model suggests that the children who are mistreated by the contractors are more likely to go to school (B = −0.853, Wald = 6.162, $p < 0.05$). Furthermore, the relation of the expenses that these collectors had over the month had a significant relationship (B = −0.886, Wald = 3.91, $p < 0.05$) to the response variable. Young NTFP collectors with exposure to a cosmopolitan lifestyle had a higher probability of school attendance; the families who visit large cities more frequently are more sensitive to their children's education.

Table 3. Results of the binary logistic regression model.

Variables	B	S.E	Wald	Df	Sig	Exp(B)
Monthly income	0.501	0.259	3.724	1	0.054	1.65
No. of years in NTFP collection	−1.347	0.545	6.106	1	0.013	0.26
Wage satisfaction	−1.581	0.749	4.454	1	0.035	0.206
Contractors' behaviour	−0.853	0.344	6.162	1	0.013	0.426
Expenses per month	−0.886	0.448	3.91	1	0.048	0.412
Cosmopolites of respondents	1.306	0.582	5.036	1	0.025	3.69
Conditions of the household	−36.328	11,034.87	0	1	0.997	0
			−2 Log likelihood = 61.814			
			Chi-squared = 19.690			

B = Beta, S.E = Standard Error, Wald = Wald Chi Square, Df = Degrees of Freedom, Sig = Significant $p \leq 0.005$.

4. Discussion

Although the role of NTFPs in sustaining the livelihoods of FPCs has been widely documented, only a handful of studies have addressed the social dimension of local communities, especially the children associated with NTFP collection [24]. The present study focuses on children as important contributors to NTFP collection activity and investigates the impact of collection commitments on their social life, and especially education. In the FPCs, particularly in developing countries, children often do the bulk of household chores in addition to collecting various NTFPs from the forest areas [26,59]. Due to the lack of other opportunities and extreme poverty, children in FPCs often have no choice but to help their parents generate extra income [60,61].

Our results indicate that children were actively involved in NTFP collection at all study sites. The majority of NTFP-collecting children were male, probably due to the greater physical strength needed for laborious activities like NTFP collection [15,26]. This could be attributed to the fact that NTFPs are often collected from steep slopes and areas which are difficult to access. The altitude in the study areas vary greatly (Figure 2c), thus it is not surprising that physically vigorous collectors would work efficiently and collect more. Furthermore, we found that nearly half of the children did not attend schools. A similar trend was reported in various forest-based villages of Ayubia National Park, Pakistan where the majority of children active as NTFP collectors did not attend school [62]. The binary logistic regression model suggests that monthly household income has a positive relationship with the choice of attending school (i.e., the children generating a good income from NTFP collection are more likely to attend a school (B = 0.501, Wald = 3.724, $p > 0.05$)). This trend may be attributed to the fact that better monthly income makes it convenient for the household to afford school fees [63]. We also observed that more than 80% of the children considered their household economic condition as 'unsatisfactory.' This is highly correlated with average monthly income of these children, which ranges between $100–$350 per month. Several studies in developing countries indicate a strong relationship between poverty with child labour and the resulting negligence of child education [64,65]. In addition to economics, the behaviour of the contractors with NTFP-collecting children is another strong predictor of choice of attending schools. Our model suggests that the children who are mistreated by contractors

are more likely to go to school (B = −0.853, Wald = 6.162, $p < 0.05$). Evidence suggests that contractors' behaviour towards the NTFP-collecting children is essential in holding out children from schools. Employers' conduct is a critical factor that governs the efficiency of employees; it not only affects work productivity of the work but allows the longevity of work with the employer [66]. Furthermore, our model suggests that the frequency with which a household of FPCs visit the nearby big cities affects the school attendance of their children. We found that the families who visit large cities frequently are more sensitive to their education. Cosmopolitanism was a statistically significant factor in our model (B = 1.306, Wald = 0.582, $p < 0.05$). This is in line with the other studies reporting that persons who visit big cities often are more aware of new opportunities and technologies and are more sensitive to social issues like healthcare and education [67].

Length of experience of NTFP collection also predicted the choice of school attendance of children. We concluded that the children who were involved in NTFP collection for less than five years were unable to attend school, whereas experienced NTFP collectors were more likely to attend school (B = −1.347, Wald = 6.106, $p < 0.05$). Various studies show that children at the start of their NTFPs involvement neglect their education, but as they become experienced, they find a way of managing school and collection [68–70]. This may be attributed to the fact that experienced NTFP collectors are often better paid and thus they can afford school. Another explanation could be that the experienced NTFP collectors are able to get their work done in shorter time and therefore manage their education along with the work. We also found that the NTFP-collecting children would often work for around 10–12 h a day in dangerous terrains of mountainous areas. The NTFPs in forests are scattered unevenly; morels, mushrooms, and a few of various edible herbs and shrubs cannot be found easily as these are present in some of the most inaccessible and difficult of terrains [71]. Extended working hours adversely affect children's education and health. These findings are in line with other studies reporting that children working for extensive periods often neglect education [30,33,72].

Several socioeconomic factors may explain the high level of child involvement in NTFP collection in our study sites. First, we carried out the survey in the summer, which is when the NTFPs production is at its peak and children are hired by contractors to maximise output. Various other survey studies show a similar scenario. During the peak NTFP collection season, the contractors often hire women and children from FPCs to cope up with the labour shortages [12,44]. Moreover, NTFP collection often requires low technical skills, so women and children often qualify for the jobs since they represent low paid and readily available labour [30,73]. Another important factor is the literacy, exposure to big cities, and attitude of family heads or parents towards their children's education. We observed that sometimes the parents become a roadblock to their children's education. Research suggests that the education of household heads has a direct relation with child labour in NTFP collection [1,74]. If the household head is not educated, the family is more likely to engage their children in income generation rather than school attendance. Some earlier studies in this region indicate issues like lack of development, poor financial conditions, and poor management in the region which can correlate to a high number of children not attending schools [75].

5. Policy Implication

The forests of Azad Jammu and Kashmir play a crucial role in sustaining the livelihoods of poverty-stricken FPCs due to the rich presence of NTFPs. The lack of formal job opportunities in the region forces the inhabitants to collect NTFPs for both fast cash and subsidence. Contractors under the local government and smugglers exploit the families of FPCs in order to harvest huge amounts of NTFPs. Children are major players in this industry as they harvest large amounts of produce for lower pay.

The NTFPs in these forests provide a rich source of nutrition in the form of valuable fruits and vegetables. NTFPs are not only sold, but also brought home since they are part of daily food intake requirements. In a country where malnutrition is an aggravated issue leading to an increasing number of cases of stunted growth, NTFPs can provide these children with a safety net in terms of malnutrition

prevention. Apart from the nutritional aspect of NTFPs, they also generate household cash that may be invested in bettering the conditions of the household. The children, while collecting these NTFPs in most cases, are forced to do tedious and hazardous long hours, thus affecting the education of these children.

Both education and income generation are important for the development of the area. However, it is possible that a nexus between NTFP collection and education attainment could be developed. This nexus could prove to be a win–win situation as it would allow children to attend schools to attain education and simultaneously collect NTFPs, thus generating income for their households. In order to create this nexus, the government must formulate policies in the education sector. The major NTFP identification, their sustainable collection techniques, cultivation methods of these plants, and finding methods should be included in the present study curriculum. These subjects and training will attract children to attend school and refine such techniques and methods that help them earn more money in addition to benefitting the forest through sustainable exploitation.

The government should mandate working and studying time by setting fixed periods for children to attend school and collect NTFPs simultaneously during the peak season of NTFP collection. Due to the lack of clear policies and regulations, there is no standard or clear marketing channel of information among the local forest inhabitants. Due to this, the middlemen are able to take the lion's share from the sell, leaving very little for the poor harvesters. In order to save resources and alleviate the poverty of FPCs, it is essential that through the forest department, local governments channelize the harvesting and selling of NTFPs. Provision of formally involving all legitimate stakeholders—especially the poor women, children and other disadvantaged collectors—schools, and contractors in policy development and the revision process could help to minimize gaps between the policy level and implementation level, contradictions, and inconstancies as well increase the effectiveness of implementation.

6. Conclusions

Natural products from the forests of Neelum Valley and the Bagh District are significant factors in sustaining the rural livelihood of local households. In this study, we show that a high proportion of children is active in the NTFP collection business in the FPCs of Pakistan. Although this venture provides household income, the involvement of young children in this business affects their development as most of them are sacrificing their education in order to work. With better developmental programs such as creating job opportunities for FPCs in nearby cities and encouraging local cottage industries, not only can the immense pressure on scarce forest resources be reduced, but children can be relieved of the extra pressures of contributing to the family income for household subsistence.

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References

1. Piya, L.; Maharjan, K.; Joshi, N.; Dangol, D. Collection and marketing of non-timber forest products by chepang community in Nepal. *J. Agric. Environ.* **2013**, *12*, 10–21. [CrossRef]
2. Mukul, S.A.; Rashid, A.Z.M.M.; Uddin, M.B.; Khan, N.A. Role of non-timber forest products in sustaining forest-based livelihoods and rural households' resilience capacity in and around protected area: A Bangladesh study†. *J. Environ. Plan. Manag.* **2016**, *59*, 628–642. [CrossRef]
3. Chao, S. *Forest Peoples: Numbers Across the World*; Forest Peoples Programme: Moreton-in-Marsh, UK, 2012; p. 27.
4. Shepherd, G.; Kazoora, C.; Mueller, D. *Forests, Livelihoods and Poverty Alleviation: The Case of Uganda Forests Policy and Institutions Working Paper, 32*; Food and Agriculture Organization of the United Nations Rome: Rome, Italy, 2013; p. 72.

5. Shackleton, C.M.; Pandey, A.K. Positioning non-timber forest products on the development agenda. *For. Policy Econ.* **2014**, *38*, 1–7. [CrossRef]
6. Wunder, S. Poverty Alleviation and Tropical Forests What Scope for Synergies? *World Dev.* **2001**, *29*, 1817–1833. [CrossRef]
7. FAO. *The State of Food Insecurity in the World 2005: Eradicating World Hunger—Key Achieving the Millenium Development Goals*; Food and Agriculture Organization of the United Nations: Rome, Italy, 2005.
8. Belcher, B.; Ruíz-Pérez, M.; Achdiawan, R. Global patterns and trends in the use and management of commercial NTFPs: Implications for livelihoods and conservation. *World Dev.* **2005**, *33*, 1435–1452. [CrossRef]
9. Belcher, B.; Schreckenberg, K. Commercialisation of Non-timber Forest Products: A Reality Check. *Dev. Policy Rev.* **2007**, *25*, 355–377. [CrossRef]
10. Emery, M.; Martin, S.; Dyke, A. Wild harvests from Scottish Woodlands Social, cultural and economic values of contemporary non-timber forest products. *For. Comm. Edinb.* **2006**, *1*, 40.
11. Mai, Y.H.; Mwangi, E.; Wan, M. Gender analysis in forestry research: Looking back and thinking ahead. *Int. For. Rev.* **2011**, *13*, 245–258. [CrossRef]
12. Sher, H.; Shah, A.H. Traditional role of morels (*Morchella* spp.) as food, medicine and income in palas valley, Pakistan. *Biol. Med.* **2015**, *7*, 1. [CrossRef]
13. Uprety, Y.; Poudel, R.C.; Gurung, J.; Chettri, N.; Chaudhary, R.P. Traditional use and management of NTFPs in Kangchenjunga Landscape: Implications for conservation and livelihoods. *J. Ethnobiol. Ethnomed.* **2016**, *12*, 19. [CrossRef]
14. International Labour Organization (ILO). *Global Estimates of Child Labour: Results and Trends, 2012–2016*; International Labour Organization: Geneva, Switzerland, 2017.
15. Hemson, D. The Toughest of Chores: Policy and Practice in Children Collecting Water in South Africa. *Policy Futur. Educ.* **2007**, *5*, 315–326. [CrossRef]
16. Heltberg, R. Determinants and impact of local institutions for common resource management. *Environ. Dev. Econ.* **2001**, *6*, 183–208. [CrossRef]
17. Dash, M.; Behera, B.; Rahut, D.B. Determinants of household collection of non-timber forest products (NTFPs) and alternative livelihood activities in Similipal Tiger Reserve, India. *For. Policy Econ.* **2016**, *73*, 215–228. [CrossRef]
18. FAO. *State of World's Forests*; Food and Agriculture Organization of the United Nations: Rome, Italy, 2009.
19. OECD. *OECD-FAO Agricultural Outlook 2011–2019*; OECD: Paris, France, 2010.
20. OECD. *Environmental Performance Reviews*; Australia OECD Publishing: Paris, France, 2019.
21. World Bank. *The World Bank Annual Report 2015*; The World Bank: Washington, DC, USA, 2015.
22. Poulton, C.; Poole, N. *Poverty and Fruit Tree Research*; Paper No. 6 Wye Coll; Department for International Development: Ashford, UK, 2001.
23. Pattanayak, S.K.; Sills, E.O. Do Tropical Forests Provide Natural Insurance? The Microeconomics of Non-Timber Forest Product Collection in the Brazilian Amazon. *Land Econ.* **2006**, *77*, 595–612. [CrossRef]
24. Mabvurira, V.; Makhubele, J.C. Children of the forests: Child gatherers and traders in non-wood forest products in the Mazowe Valley area in Zimbabwe. *Int. J. Mod. Anthropol.* **2018**, *2*, 48–62. [CrossRef]
25. Barwell, I. *Transport and the Village: Findings from African Village-Level Travel and Transport Surveys and Related Studies*; World Bank Discussion Paper; The World Bank: Washington, DC, USA, 1996.
26. Porter, G.; Hampshire, K.; Abane, A.; Munthali, A.; Robson, E.; Mashiri, M.; Dube, S. Child Porterage and Africa's Transport Gap: Evidence from Ghana, Malawi and South Africa. *World Dev.* **2012**, *40*, 2136–2154. [CrossRef]
27. Mull, L.D.; Kirkhorn, S.R. Child Labour in Ghana Cocoa Production: Focus upon Agricultural Tasks, Ergonomic Exposures, and Associated Injuries and Illnesses. *Public Health Rep.* **2017**, *120*, 649–655. [CrossRef] [PubMed]
28. Nkamleu, G.; Kielland, A. Modeling Farmer's Decisions on Child Labour and Schooling in the Cocoa Sector. *Agric. Econ.* **2006**, *35*, 319–333. [CrossRef]
29. Sutherland, M.E. Child Labour in Sub-Saharan Africa. In *Comparative Studies South Asia Africa Middle East*; Duke University Press: Durham, NC, USA, 2006; Volume 26, pp. 149–151.
30. Dammert, A.C. Child labour and schooling response to changes in coca production in rural Peru. *J. Dev. Econ.* **2008**, *86*, 164–180. [CrossRef]

31. Sviatschi, M.M. What determines female autonomy? Evidence from Bangladesh. *J. Dev. Econ.* **2009**, *90*, 179–191.
32. Orrnert, A. *Impact of Education Interventions for Working Children*; UK Institute Development Studies: Brighton, UK, 2018.
33. Beegle, K.; Dehejia, R.; Gatti, R. Why Should We Care About Child Labour? The Education, Labour Market, and Health Consequences of Child Labour. *J. Hum. Resour.* **2012**, *44*, 871–889.
34. Siddiqui, M.F.; Shaukat, S.S.; Ahmed, M.; Khan, N.; Khan, I.A. Vegetation-environment relationship of conifer dominating forests of moist temperate belt of Himalayan and Hindukush Regions of Pakistan. *Pak. J. Bot.* **2013**, *45*, 577–592.
35. Shinwari, Z.K. Medicinal plants research in Pakistan. *J. Med. Plants Res.* **2010**, *4*, 161–176.
36. Ahmad, K.; Pieroni, A. Folk knowledge of wild food plants among the tribal communities of Thakht-e-Sulaiman. *J. Ethnobiol. Ethnomed.* **2016**, *12*, 17–36. [CrossRef] [PubMed]
37. Sher, H.; Aldosari, A.; Ali, A.; De Boer, H.J. Economic benefits of high value medicinal plants to Pakistani communities: An analysis of current practice and potential. *J. Ethnobiol. Ethnomed.* **2014**, *10*, 1–16. [CrossRef] [PubMed]
38. Abbasi, A.M.; Khan, M.A.; Ahmad, M.; Zafar, M. *Medicinal Plant Biodiversity of Lesser Himalayas-Pakistan*; Springer: New York, NY, USA, 2012.
39. Hussain, K. An ethno botanical survey of important wild medicinal plants of Hattar district Haripur, Pakistan. *Ethnobot* **2008**, *12*, 29–35.
40. Shinwari, Z.K.; Qaiser, M. Efforts on conservation and sustainable use of medicinal plants of Pakistan. *Pak. J. Bot.* **2011**, *43*, 5–10.
41. Saqib, Z.; Naseem Malik, R.; Shinwari, M.I.; Shinwari, Z.K. Species richness, ethnobotanical species richness and human settlements along a Himalayan altitudinal gradient: Prioritizing plant conservation in Palas valley, Pakistan. *Pak. J. Bot.* **2011**, *43*, 129–133.
42. Khan, B.; Abdukadir, A.; Qureshi, R.; Mustafa, G. Medicinal uses of plants by the inhabitants of Khunjerab National Park, Gilgit, Pakistan. *Pak. J. Bot.* **2011**, *43*, 2301–2310.
43. Ijaz, F.; Iqbal, Z.; Rahman, I.U.; Ali, N.; Afzal, M. Alternative and Integrative Medicine People-Plants Interaction and Its Uses: A Science of Four Words "Ethnobotany". *Altern. Integr. Med.* **2017**, *6*, 1–2. [CrossRef]
44. Latif, A.; Shinwari, Z.K.; Begum, S. Potential and Market Status of Mushrooms as Non-Timber Forest Products in Pakistan. *Ethnobot. Leafl.* **2005**, *1*, 41.
45. Sher, H.; Hussain, F. Ethnobotanical evaluation of some plant resources in Northern part of Pakistan. *Afr. J. Biotechnol.* **2009**, *8*, 4066–4076.
46. Abbasi, A.; Khan, M.A.; Shah, M.H.; Shah, M.M.; Pervez, A.; Ahmad, M. Ethnobotanical appraisal and cultural values of medicinally important wild edible vegetables of Lesser Himalayas-Pakistan. *J. Ethnobiol. Ethnomed.* **2013**, *9*, 66. [CrossRef] [PubMed]
47. Khan, S.M.; Ud Din, N.; Ilyas, M.; Sohail; Ur Rahman, I.; Ijaz, F.; Iqbal, Z.; Ali, Z. Ethnobotanical Study of Some Medicinal Plants of Tehsil Kabal, District Swat, KP, Pakistan. *Med. Aromat. Plants* **2015**, *4*.
48. Dar, M.; Cochard, R.; Shrestha, R.P.; Ahmad, S. Plant resource utilization by local inhabitants around Machiara National Park, Azad Kashmir, Pakistan. *J. Food Agric. Environ.* **2012**, *10*, 1139–1148.
49. Rasul, G.; Hussain, A. Sustainable Food Security in the Mountains of Pakistan: Towards a Policy Framework. *Ecol. Food Nutr.* **2015**, *54*, 625–643. [CrossRef]
50. Owen, L.A.; Kamp, U.; Khattak, G.A.; Harp, E.L.; Keefer, D.K.; Bauer, M.; Bauer, M.A. Landslides triggered by the 8 October 2005 Kashmir earthquake. *Geomorphology* **2008**, *94*, 1–9. [CrossRef]
51. Dar, M. Ethnobotanical uses of Plants of Lawat District Muzaffarabad, Azad Jammu and Kashmir. *Asian J. Plant Sci.* **2003**, *2*, 680–682.
52. Siddiqui, M.F.; Ahmed, M.; Khan, N.; Khan, I.A. A quantitative description of moist temperate conifer forests. *Int. J. Biol. Biotech.* **2010**, *7*, 175–185.
53. Bano, A.; Ayub, M.; Rashid, S.; Sultana, S.; Sadia, H. Ethnobotany and conservation status of floral diversity of Himalayan range of Azad Jammu and Kashmir–Pakistan. *Pak. J. Bot.* **2013**, *45*, 243–251.
54. Shah, G.M.; Khan, M.A. Check List of Medicinal Plants of Siran Valley Mansehra-Pakistan. *Ethnobot. Leafl.* **2006**, *10*, 63–71.

55. Mulvey, J.M.; Awan, S.U.; Qadri, A.A.; Maqsood, M.A. Profile of injuries arising from the 2005 Kashmir 482 Earthquake: The first 72 h. *Injury* **2008**, *39*, 554–560. [CrossRef] [PubMed]
56. Biernacki, P.; Waldorf, D. Snowball sampling: Problems and techniques of chain referral sampling. *Sociol. Methods Res.* **1981**, *484*, 141–163. [CrossRef]
57. Etikan, I. Comparision of Snowball Sampling and Sequential Sampling Technique. *Biometr. Biostat. Int. J.* **2016**, *3*, 1–2. [CrossRef]
58. Madsen, L. Maximum Likelihood Estimation of Regression Parameters with Spatially Dependent Discrete Data. *J. Agric. Biol. Environ. Stat.* **2019**, *14*, 375–391. [CrossRef]
59. Porter, G.; Blaufuss, K.; Acheampong, F.O. Filling the family's transport gap in sub-Saharan Africa: Young people and load carrying in Ghana. In *Geographies of Children, Youth and Families: An International Perspective*; Routledge: London, UK, 2010; Volume 44, pp. 189–202.
60. Mulenga, B.P.; Richardson, R.B.; Mapemba, L.; Tembo, G. The Contribution of Non-Timber Forest Products to Rural Household Income in Zambia. Working Paper no. 54 Food Security Research Project Lusaka, Zambia; Food Security Collaborative Policy Briefs; June 2011; pp. 1–19, 28. Available online: https://pdf.usaid.gov/pdf_docs/pnaeb451.pdf (accessed on 1 May 2019).
61. Saifullah, K.; Binti, F. Income Dependency on Non-timber Forest Products: An Empirical Evidence of the Indigenous People in Peninsular Malaysia. *Soc. Indic. Res.* **2018**, *135*, 215–231. [CrossRef]
62. Adnan, M.; Begum, S.; Khan, A.L.; Tareen, A.M.; Lee, I.-J. Medicinal plants and their uses in selected temperate zones of Pakistani Hindukush-Himalaya. *J. Med. Plants Res.* **2012**, *6*, 4113–4127.
63. Shackleton, S.; Paumgarten, F.; Kassa, H.; Husselman, M.; Zida, M. Opportunities for Enhancing Poor Women's Socioeconomic Empowerment in the Value Chains of Three African Non-Timber Forest Products (NTFPs). *Int. For. Rev.* **2011**, *13*, 136–151. [CrossRef]
64. Farrington, J.; Slater, R.; Holmes, R. Social protection and pro-poor agricultural growth: What scope for synergies? In *Natural Resource Perspectives*; No. 91; Overseas Development Institute: London, UK, 2004.
65. Mujawamariya, G.; Karimov, A.A. Forest Policy and Economics Importance of socio-economic factors in the collection of NTFPs: The case of gum arabic in Kenya. *For. Policy Econ.* **2014**, *42*, 24–29. [CrossRef]
66. Brown, S.; Gray, D.; Mchardy, J.; Taylor, K. Journal of Economic Behavior and Organization Employee trust and workplace performance. *J. Econ. Behav. Organ.* **2015**, *116*, 361–378. [CrossRef]
67. Dey, A.N.; Datta, S.; Sharma, B. Documentation of ethno-medicinal practices: A case study on tribal forest fringe dwellers of Terai West Bengal in India. *J. Appl. Nat. Sci.* **2015**, *7*, 822–827. [CrossRef]
68. Orazem, P.F.; Gunnarsson, V. *Child Labour, School Attendance and Academic Performance: A Review*; ILO/IPEC Working Paper; International Labour Organization: Geneva, Switzerland, 2003.
69. Levang, P.; Lescuyer, G.; Noumbissi, D.; Déhu, C. Does gathering really pay? Case studies from forest areas of the East and South regions of Cameroon. *Forests Trees Livelihoods* **2015**, *24*, 128–143. [CrossRef]
70. Yobo, C.M.; Ito, K. Trade of the most popular Indigenous fruits and nuts, threats and opportunities for their sustainable management around the Ivindo National Park, Gabon. *Int. J. Biodivers. Conserv.* **2015**, *7*, 85–102.
71. Haq, A.; Siddiqui, M.T.; Zubair, M.; Yaqoob, S.; Ayub, C.M. Modeling Socio-Economic Characteristics and Involvement in Non Wood Forest Products Exploitation in Ajk, Pakistan'S. *Pak. J. Agric. Sci.* **2015**, *52*, 479–482.
72. Beuermann, D.W. *Telecommunications Technologies, Agricultural Profitability, and Child Labour in Rural Peru*; Working Paper Series; Central Bank of Peru: Lima, Peru, 2011.
73. Adedayo, A.G.; Falade, O.I. NTFP Utilization and Its Impact on Poverty Reduction among Rural Women in Ondo State, Nigeria. *J. Exp. Agric. Int.* **2019**, *37*, 1–11. [CrossRef]
74. Mulenga, B.P.; Richardson, R.B.; Mapemba, L. Environment and Development Economics: Rural household participation in markets for non- timber forest products in Zambia. *Environ. Dev. Econ.* **2014**, *19*, 487–504. [CrossRef]
75. Farooq, M.; Kai, Y. A Critical Study of Primary Education Situation in AJK State. *Int. Online J. Prim. Educ.* **2016**, *5*, 40–50.