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COVID-19 and Rural Households' Environmental Incomes in Iran

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Abstract: The COVID-19 pandemic negatively impacted rural livelihoods in the Global South. Environmental products, such as medicinal plants and fodder harvested in forests and rangelands, are a major source of income in many rural communities. In this paper, we investigate environmental product-related income and economic responses to the COVID-19 pandemic using face-to-face interviews with randomly selected household heads ($n = 384$) in 26 villages in northwestern Iran. We found that the main impacts of the COVID-19 pandemic were a decrease in income (reported by 72% of households), an increased health risk (48%), and persistent fear of infection by COVID-19 (45%). Household economies were found to be particularly reliant on animal husbandry (26% of total annual household income) and farming (26%). Environmental products contributed an average of 18% of total household income. Almost half of the households (45%) experienced lower livestock prices, a lack of buyers (49%), and a lockdown of animal markets (38%). Fodder (collected by 45% of households), medicinal plants (42%), and wild fruits (29%) were the most important environmental products harvested during the COVID-19 pandemic. We found a negative but not significant effect of the COVID-19 pandemic on total rural household income and that the COVID-19 pandemic led to a slight non-significant decrease in relative forest income. The negative impact on relative forest income resonates well with existing scholarship on livelihoods and negative shocks. It is noteworthy, however, that there is substantial scope for increasing environmental incomes and, thus, the potential of environmental products as a response option in the face of covariant shocks such as COVID-19.

Keywords: diseases; livelihoods; rural communities; forest; West Asia



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1. Introduction

The COVID-19 pandemic has had global impacts, including about 4.2 million deaths and 90,630 deaths around the world and Iran, respectively [1]. There is a growing concern about the economic impacts of the pandemic on rural households involved in small-scale activities in the Global South [2–4]. The Global South refers to countries previously described as “developing”, “less developed,” or “underdeveloped”. Shackleton and de Vos (2022) found that half of the global non-timber forest product (NTFP) users are located in rural regions of the Global South. Many rural households depend on small-scale industries and micro-subsistence strategies such as animal husbandry, small-scale agriculture, and harvesting of environmental products, including NTFPs, to generate income [4]. These activities were disrupted when the pandemic constrained the ability to harvest, sell, and market products.

The diverse and important roles NTFPs play across the globe are increasingly being acknowledged. In the global South, NTFPs often play a vital role in rural livelihoods. Almost 80% of rural households across Asia, Africa, and Latin America collect wild foods, and forest environmental resources, in general, can account for significant shares of rural household income, with estimates ranging from 21 to 27% [5]. Environmental income is the capture of value added in “alienation or consumption of natural capital within the first link in a market chain, starting from the point at which the natural capital is extracted or appropriated” [6]. This source of income, from products such as medicinal plants and fodder harvested in forests and rangelands, is of substantial importance to rural households, and many studies have documented their economic importance [7–9]. For example, analyzing 54 case studies across the world, Vedeld et al. (2007) showed that forest products contributed an average of 22% of total rural household income [10]. Subsequent studies have confirmed this finding in Iran [9], Africa [11,12], Asia [13,14], Europe [15], and the US [16].

Likewise, there is evidence of the impacts of diseases on rural livelihoods. Russell (2004) assessed the economic costs of illness for households in developing countries by reviewing the literature on malaria, tuberculosis, and HIV/AIDS. He found that the direct and indirect costs were less than 10% of household income [17]. There have been studies on the socio-economic impacts of malaria on rural households in Ethiopia, Tanzania, and Uganda [18–20]. HIV has devastated many families and communities due to excess morbidity and mortality while also leading to changed farming practices because of labor migration, crop and livestock pests and diseases, declining soil fertility, changes in commodity markets, and a growing off-farm sector [20]. Ordaz-Németh and co-workers [21] investigated the effects of income, education, and literacy on changes in bushmeat consumption during the Ebola crisis. They found an overall decrease in bushmeat consumption across all income levels, although the rate of bushmeat consumption in high-income households decreased less than in low-income households. Gatiso et al. (2018) studied changes in agricultural production and livelihoods during the Ebola virus disease (EVD) epidemic in Liberia [21]. They collected data from 623 households across the country in 2015 using a systematic random sampling design and found that the annual income of sampled households in EVD-affected and non-affected communities did not differ. Nonetheless, the majority of sampled households reported an income decrease compared to the year before the survey. Ahmed et al. (2021) [2] carried out a telephone survey of roughly 10,000 rural households in Bangladesh three weeks after the country went into a COVID-19 lockdown. They found that about 90% of households experienced a negative income shock. In relation to forests and forestry, we know that COVID-19 has disrupted forest enterprises and trade [22] and erased gains from poverty reduction strategies implemented in past decades [23], but also that forest products may play a role in supporting a green recovery [24].

Our hypothesis in this research is that the COVID-19 pandemic adversely impacted rural household incomes in Iran, and, in response, they have increased their reliance on environmental products. Using household-level data from northwestern Iran, we investigated the COVID-19 impact on (i) rural households' income and (ii) rural households' responses.

2. Materials and Methods

2.1. Study Area

In order to understand the role of forests and rangelands on household income during the COVID-19 pandemic, we selected the East Azerbaijan Province in the Arasbaran region in northwestern Iran as our study area (Figure 1). This province has an area of 45,650 km² with a population of about 3.9 million people. According to the statistics of the General Department of Natural Resources and Watershed Management of East Azerbaijan Province in 2019, the area of forests and rangelands totaled 188,000 hectares and 2,473,000 hectares, respectively, and are rich in plant and animal species. Around 24% of the rangelands are classified as having good forage production, while 55% and 21% are in the medium and

poor categories [25]. About 51% of the rural population is engaged in farming, and the main crops are wheat and barley. Other economic activities include animal husbandry, weaving, and collecting environmental products [9].

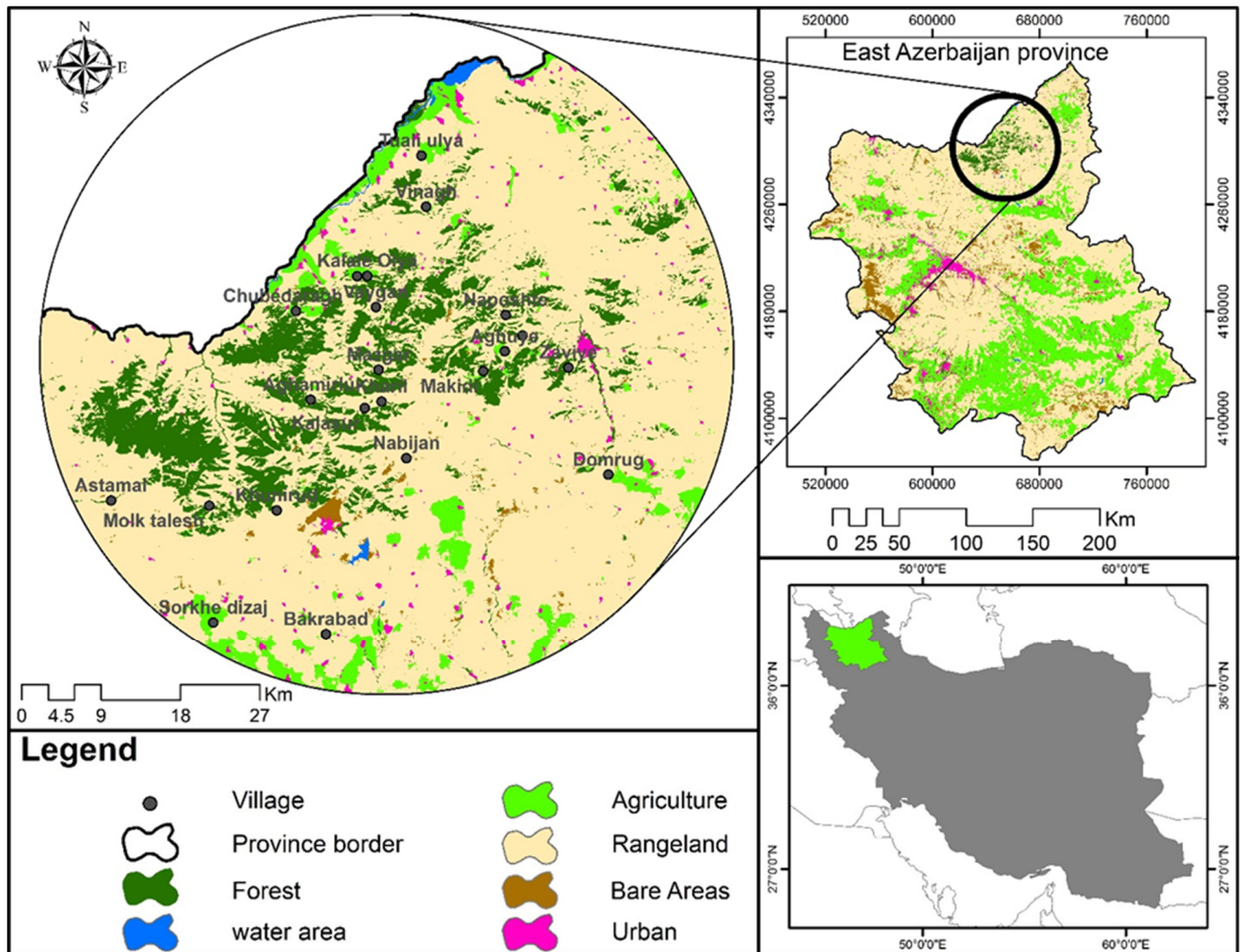


Figure 1. Map of the study area of East Azerbaijan Province, including the location of the sampled villages.

2.2. Data Collection and Analysis

Research permission was obtained from the University of Tabriz, Iran, through a formal letter. Data were collected from May 2020 to August 2021. Prior to implementing data collection, all respondents were asked to provide their informed consent to participate in the project [26]. The purpose of the project was briefly explained, and all respondents were informed that they could decline to answer any specific questions. We collected data using semi-structured face-to-face interviews with household heads [27]. The main topics covered included job status, income by sources, literacy, age, gender, the status of tourism and the effect of tourism on rural household's income, lifestyle, impacts of the COVID-19 pandemic on household income, the status of animal husbandry, sales, and marketing problems, production problems, food access, and coping strategies (the research questionnaire is available in the supplementary materials). Respondents were randomly selected, with replacements included based on their accessibility within the village [26,28]. The sample size was calculated using the Cochran formula with a five percent error. Within the study area, there were approximately 33,949 households in 615 villages [29]. We used a

two-stage sampling process. In the first stage, we randomly selected 26 villages among the 615 villages, and in the second stage, 411 households were randomly selected to fill out the questionnaire in the 26 villages. There were no non-participants; all selected households were contacted and agreed to participate in the research. A total of 18 households could not be met in the villages and were subsequently interviewed by phone (5) or online (13). Basic distributional statistics showed no difference between the large sample and the small (phone and online) sample (e.g., regarding the mean of household size, $t = 1.239$, p -value = 0.239). During the data collection, we observed strict COVID-19 health protocols. The average time of a face-to-face interview was between 40 and 60 min. During post-data collection, 27 questionnaires were omitted due to missing values (16 questionnaires) caused by a lack of answers and low accuracy and attention of respondents (11 questionnaires). Finally, 384 questionnaires were entered into the SPSS database for analysis.

We estimated household net income derived from different sources, including farming, collection of environmental products, animal husbandry, beekeeping, and off-farm employment [21]. Regarding livestock, each cow was considered four livestock units, and each sheep and goat older than six months was considered one livestock unit [30]. Net product income was calculated as:

$$NI_h = \sum_{i=1}^n p_i y_i - c_i \quad (1)$$

where NI_h is the net income for household h , n is the number of products, p_i is the price of product i ; y_i is the total production of product i , and c_i is the variable cost of production for product i .

It is generally easier to confront income shortfalls, such as unfavorable market conditions, if a household has diversified livelihood strategies and income sources rather than relying on a single income activity [31]. We computed a household income diversification index using the inverse Simpson index of diversity [32]:

$$\text{Index of diversification} = \frac{1}{\sum_{i=1}^N p_i^2} \quad (2)$$

where N is the number of household income sources, each generating net income P_i , with the denominator calculated as:

$$\sum_{i=1}^N p_i^2 = \left(\frac{I_1}{I_T}\right)^2 + \left(\frac{I_2}{I_T}\right)^2 + \left(\frac{I_3}{I_T}\right)^2 + \left(\frac{I_4}{I_T}\right)^2 + \left(\frac{I_5}{I_T}\right)^2 \quad (3)$$

where I_T is total household income, calculated as the sum of net income from cropland and farming (I_1), environmental products (I_2), livestock (I_3), beekeeping (I_4), and off-farm employment (I_5).

Ordinary least squares regression was employed to assess the associations between socio-demographic characteristics, the variables related to the impact of the COVID-19 pandemic on daily life, and the relationships between socio-demographic characteristics with household-level relative forest income (RFI) and total income. These predictive variables are summarized in Table 1, including their expected sign and previous work on the specified relationships. The variance inflation factor for each of the explanatory variables was low (less than 2, Supplementary Materials), indicating that multicollinearity was not problematic. All tests were two-tailed, and a p -value of $p < 0.05$ was set to determine statistical significance.

Table 1. Expected relationships between predictive variables and household-level RFI and total income.

Variable	Expected Sign		Comments
	Relative Forest Income	Total Income	
Age of respondent (years)	—	+	Young households rely more on forest extraction, and older households have higher total income [12,33–35]
Age square of respondent (years)	+	—	Younger and older households rely more on forest income and have lower total income, i.e., the effect is not linear with age [12]
Female-headed household (0 = female)	+	—	Female-headed (dummy = 1) households have fewer land and livestock assets than male-headed households and hence rely more on lower remunerative forest extraction activities, meaning higher relative forest income and lower total income [35,36]
Education (years)	—	+	High-educated households have more access to income opportunities and hence lower forest reliance and higher total income [9,11,35,37]
Household size (no. of persons)	+	+	More people means more available labor, some of which is allocated to forest product collection [12,38,39]
COVID effect on daily life (0 = no)	+	—	COVID-19 lowers total income and pushes people into higher reliance on forest products [24,40]
Agricultural land owned (ha)	—	+	More agricultural land means less reliance on forest products and higher total income [35,41,42];
Number of livestock	—	+	More livestock means less reliance on forest products and higher total income [41]
Animal husbandry (0 = no)	—	+	Engagement in animal husbandry means lower forest reliance and higher total income [36]

3. Results

3.1. Characteristics of Sample Respondents

The majority of respondents (86%) were male with an average age (\pm SD) of 43 ± 17 years. Almost 27% of respondents were illiterate and had not attended school; the average number of years of schooling was seven; about 15% had graduated from universities. Household size varied from one to nine individuals, with an average of 4.1 ± 1.6 . The majority of respondents have lived in the studied villages for their entire lives (87%), while 13% had emigrated from large cities such as Tehran (65%), Tabriz (26%), and Karaj (9%). About a third (37%) reported arriving at the beginning of the COVID-19 pandemic.

3.2. The Respondents' Information on COVID-19 and Its Impact on Rural Household Income

Almost all respondents stated they had heard about COVID-19, with most (85%) finding it a dangerous disease. Almost a third of the sampled households (31%) reported an incidence of COVID-19 in their family, with about 224 infected persons. The infected persons used different methods for their treatment, including medicinal plants (51%), hospitalization (27%), treatment by a local doctor (17%), and other methods (5%, such as home quarantine). Respondents reported that to protect themselves from COVID-19, they did not attend funerals and wedding ceremonies (60%), did not engage in handshaking and kissing (55%), and did not visit family and relatives (47%).

More than a quarter of the respondents (29%) stated no difference in dietary diversity before and during the COVID-19 pandemic. About 61% of respondents reported that their dietary diversity during the COVID-19 pandemic had changed, with two-thirds of these respondents reporting a decrease in dietary diversity. The vast majority of respondents (93%)

believed that the COVID-19 pandemic had negatively affected their daily life (Figure 2). Most reported experiencing a decrease in income (72%), followed by increased health risk (48%), persistent fear about contracting COVID-19 (45%), and a shortage of household goods (23%).

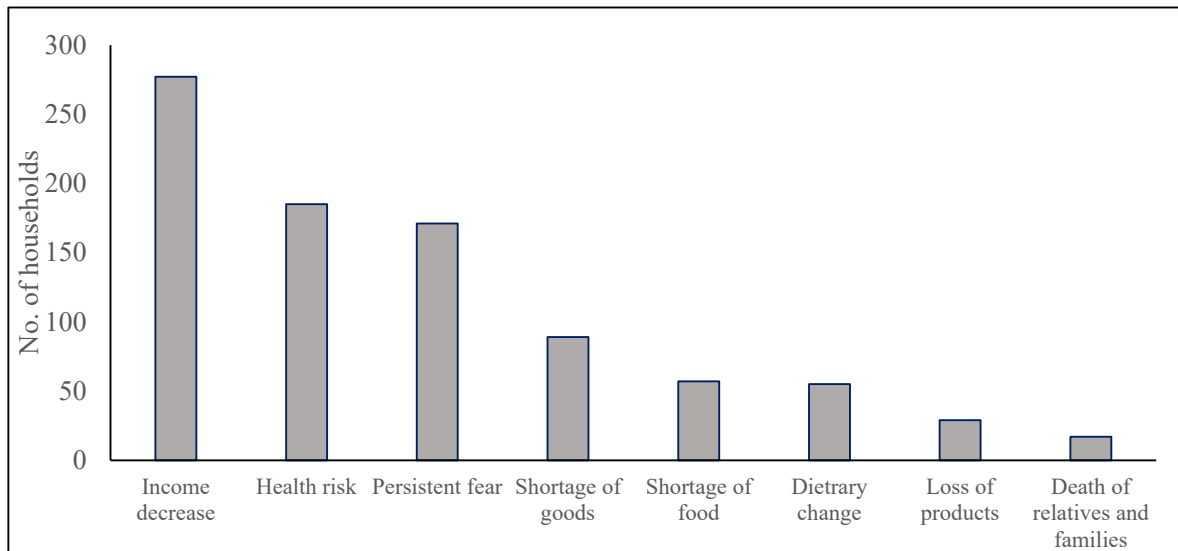


Figure 2. Impact of COVID-19 on the daily life of respondents (n = 384) in rural communities of Northwest Iran.

The annual average household income in our study area was reported to be 1023 million Iranian rials (equivalent to 24,357 USD according to the exchange rate of the Central Bank of Iran [43]) during the COVID-19 pandemic. The average index of diversification of income was calculated to be 1.09 for all sampled households. Environmental income was derived from collecting and selling medicinal plants, fruit, fodder, and mushrooms from forests and rangelands. The absolute income per product group varied during the COVID-19 pandemic (Figure 3), and the income derived from collecting fodder was significantly higher than from other products harvested from forests and rangelands.

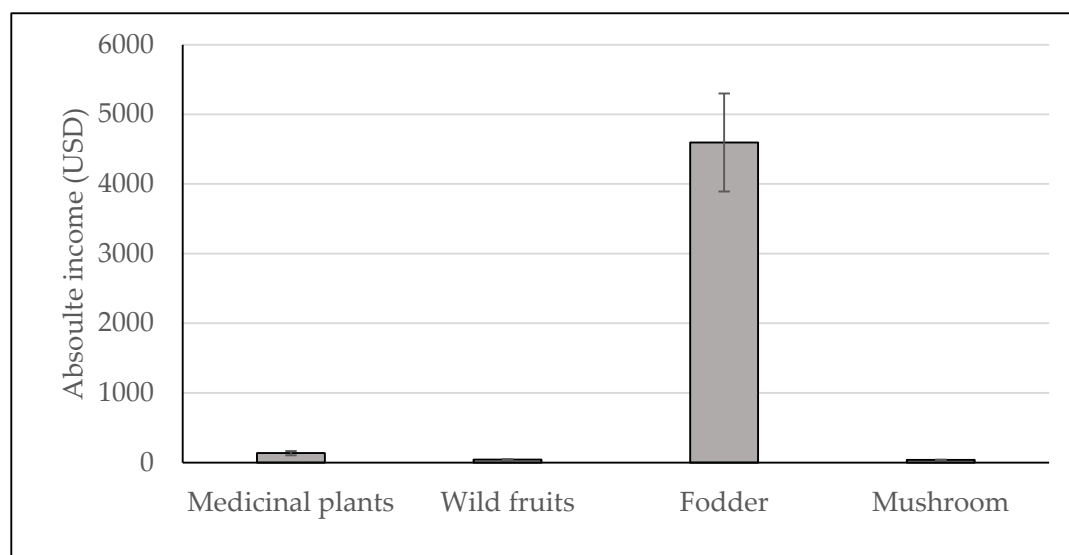


Figure 3. The average absolute income (SE) by household (n = 384) per product group during COVID-19 in rural communities of Northwest Iran.

Farming and animal husbandry, with about equal shares, comprised about 52% of total household income. The collection of environmental products made up 18% of total household income (Figure 4).

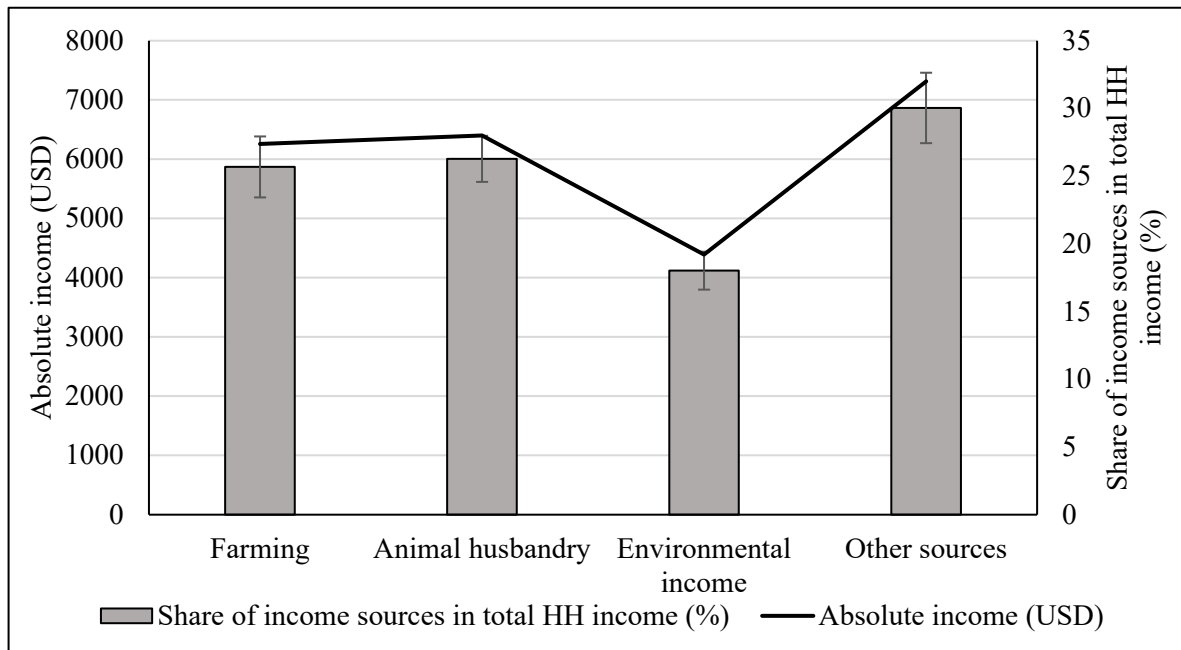


Figure 4. Share of income sources in total rural household ($n = 384$) income (% , right-hand scale) (SE) and absolute income (left-hand scale) during the COVID-19 pandemic in Northwest Iran. Other sources included beekeeping and off-farm employment.

There was variation in the relative importance of different income sources. Farming income increased from income quartile 1 (Q1) to income quartile 4 (Q4), while the share of environmental income in total household income was higher in Q1 than in other income quartiles (Figure 5). Also, Figure 6 shows the relationship between the share of income derived from environmental products and total rural household income.

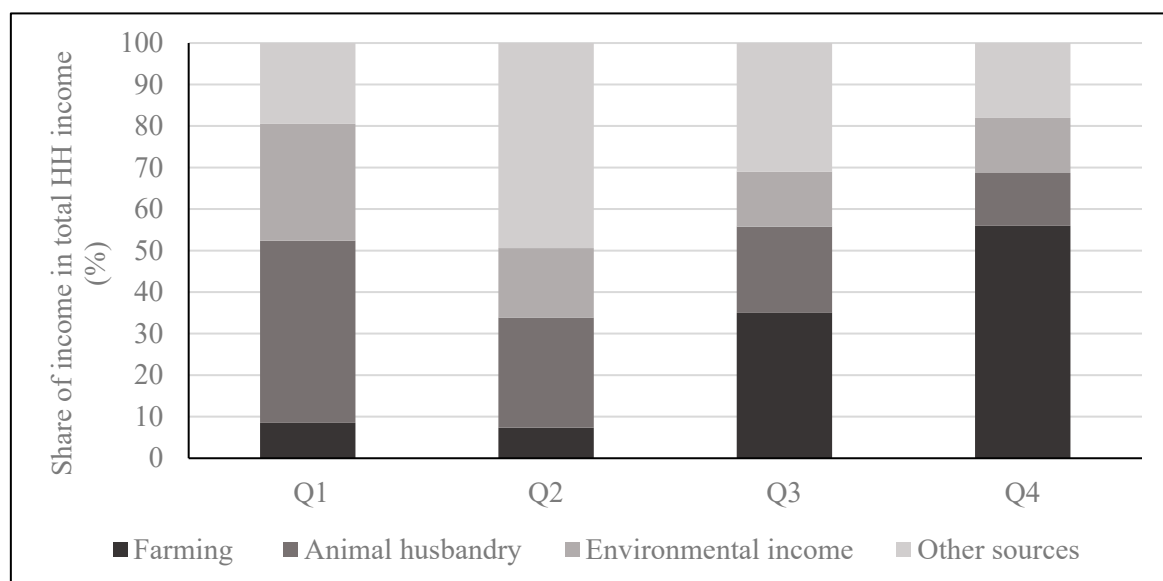


Figure 5. Variations in household-level income composition (%) across income quartiles (Q1–Q4) during COVID-19 in Northwest Iran (Q1: wealthier–Q4 (the poorest)).

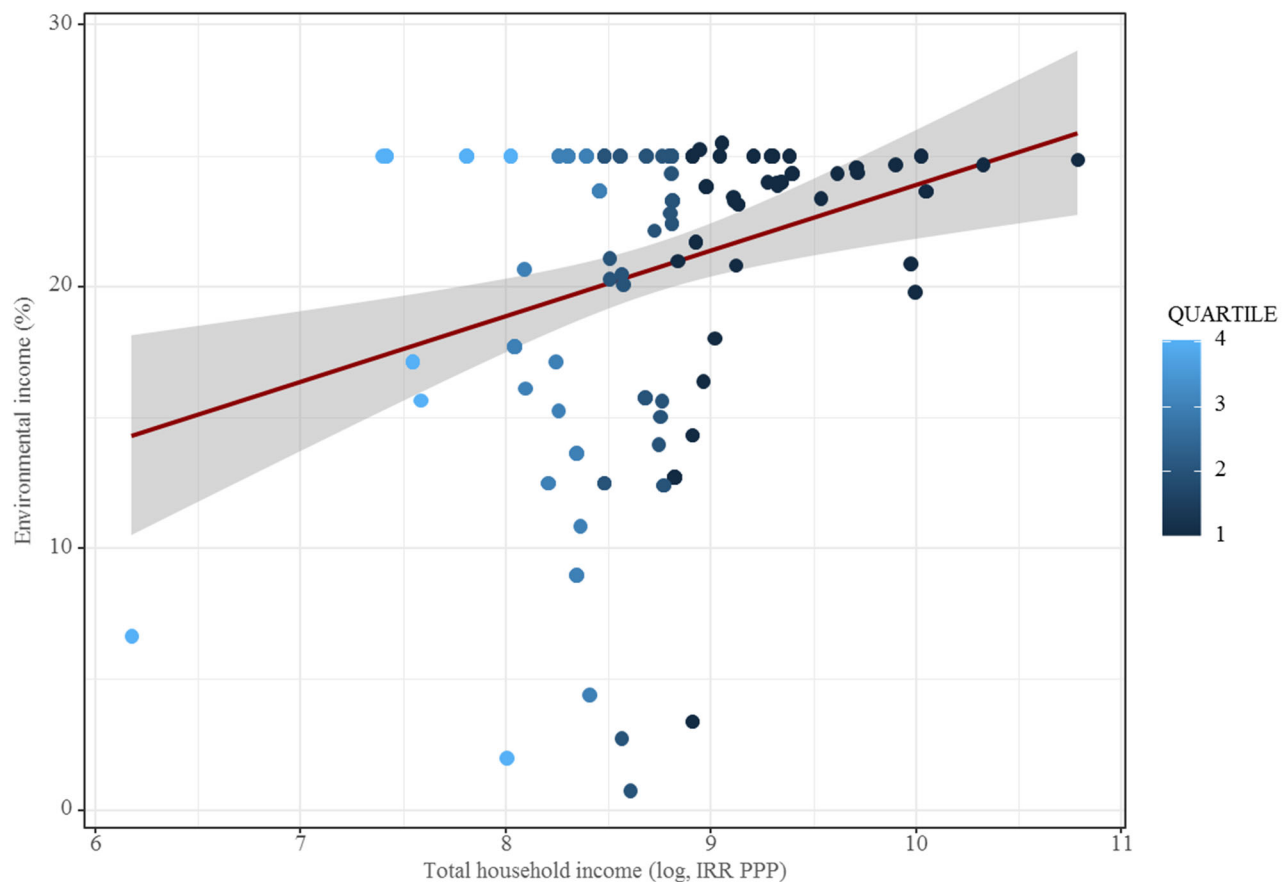


Figure 6. The relationship between the shares of income derived from environmental products and total rural household income. Grey band: CI = confidence interval at 95%. (Q1: wealthier–Q4 (the poorest)).

Factors Influencing Rural Households' Relative Forest Income (RFI) and Total Household Income

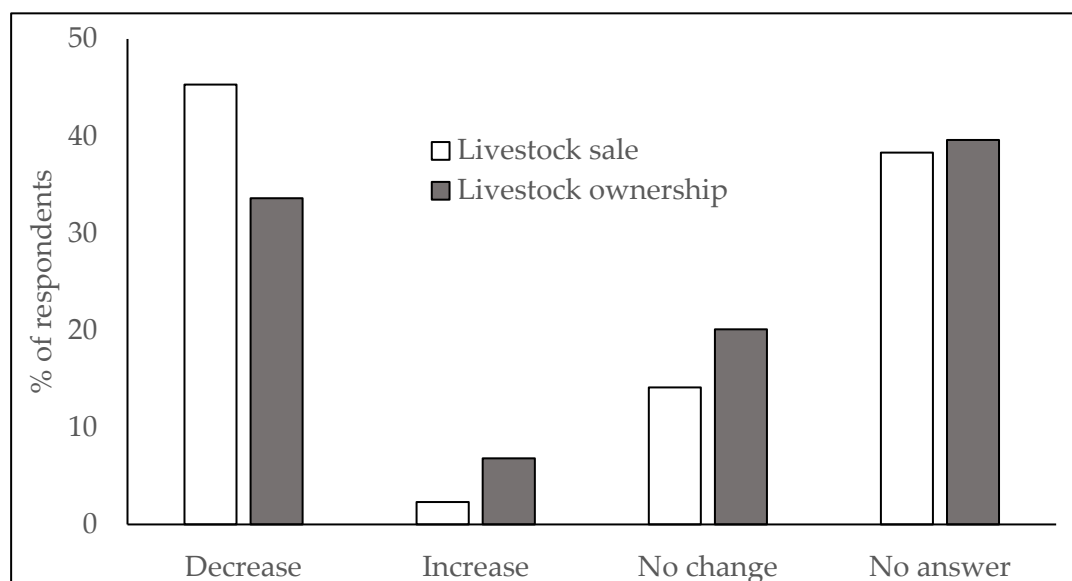
Table 2 presents the results of household-level determinants of forest income and total rural household income. There is a non-significant quadratic curve for the effect of age on relative forest income, with an increasing effect that decreases as households get older. The opposite but significant non-linear relationship is found for total income. Female-headed households were found to have higher RFI and lower total income. Households with more years of education tended to have lower relative forest and total income. This relationship was unexpected but not significant. An increase in household size was associated with a non-significant higher RFI and total household income. More agricultural land was associated with lower forest income and higher total income. We observed the opposite pattern for the number of livestock: having more livestock was associated with higher relative forest income and lower total household income. Households engaged in animal husbandry had a significantly lower RFI and lower total income (not significant). There was a non-significant negative effect of the COVID-19 pandemic predictor on both household-level relative forest income and total income.

Table 2. Ordinary Least Squares regression (OLS) model of household (n = 384) RFI and total household income against socio-economic characteristics.

Variable	Relative Forest Income	Total Income
Age of respondent (years)	0.128 (0.346) ^a	−0.854 ** (−2.287)
Age of respondent square	−0.153 (−0.412)	0.845 ** (2.254)
Female-headed household (0 = female)	0.027 (0.361)	−0.054 (−0.712)
Education (years)	−0.046 (−0.62)	−0.008 (−0.11)
Household size (no. of persons)	0.001 (0.019)	0.024 (0.35)
COVID effect on daily life (0 = no)	−0.001 (−0.009)	−0.044 (−0.581)
Agricultural land owned (ha)	−0.141 ** (−2.084)	0.146 ** (2.124)
Number of livestock	0.076 (1.006)	−0.049 (−0.635)
Animal husbandry (0 = no)	−0.237 *** (−3.09)	−0.121 (−1.563)

The values under RFI and total income are coefficient and ^a t-values in brackets. ** indicates significance at the 5% level, and *** indicates significance at the 1% level. Forest income model (F = 3.277, sig < 0.001), Total income model (F = 2.669, sig < 0.05).

Figure 7 illustrates the problems of relying on the traditional income source of livestock. Almost half of the respondents (45%) stated that the COVID-19 pandemic had decreased livestock income because of lower prices (45%), lack of buyers (49%), and lockdown of the animal markets (38%). About 34% of respondents said their number of livestock had decreased during the COVID-19 pandemic. When respondents were asked if the decline in animal sales caused this decrease in income, over half (58%) reported this was true, while 42% disagreed. About 64% of the respondents stated that their number of livestock had increased because they were unable to sell their animals during the pandemic.

**Figure 7.** Impacts of COVID-19 on the sale and ownership of livestock in rural communities of Northwest Iran.

3.3. Rural Household Responses to COVID-19

Spending savings (41%) and selling livestock (35%) were the two most important coping strategies to compensate for the income lost due to the COVID-19 pandemic. Few respondents reported that they had harvested more forest (1%) and rangeland (6%) products during the pandemic (Figure 8).

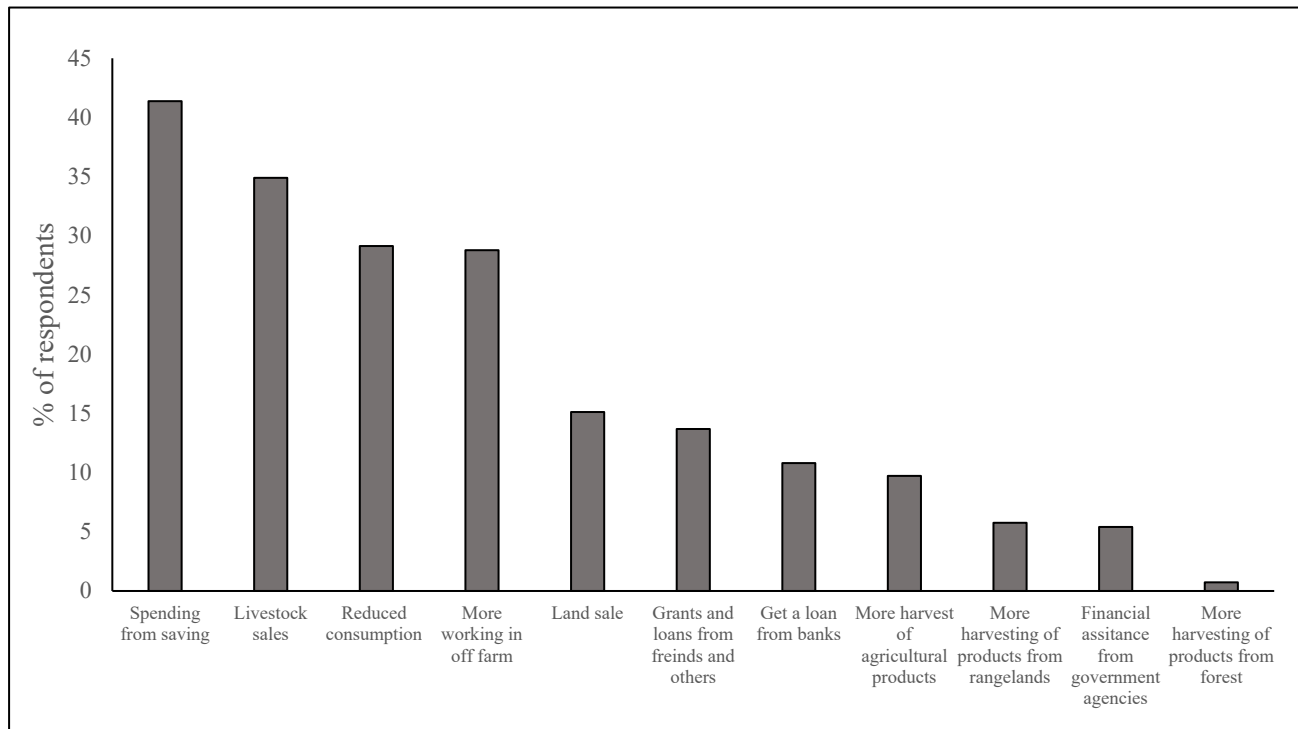


Figure 8. Household-level coping activities used to compensate for the loss of income during the COVID-19 pandemic in rural communities of Northwest Iran.

Rural households continued to use environmental products during the COVID-19 pandemic even if they did not increase harvests. Survey respondents were asked if increasing their use of forests was an effective strategy to compensate for lost income during the COVID-19 pandemic. Over a quarter of respondents (27%) stated that forests could decrease economic pressure, while 73% believed they could not. Local respondents using the Arasbaran forests reported collecting more than one forest product, including fodder (45%), medicinal plants (42%), and wild fruit (29%) (Figure 9). Considering rangelands, 68% of respondents stated that harvesting products from rangelands represented a good strategy for supplementing lost income during the COVID-19 pandemic. The three main benefits of rangelands reported by survey respondents in rural communities in Northwest Iran were animal grazing (74%), collecting medicinal plants (49%), and harvesting fodder (47%) (Figure 9).

Almost three-quarters of respondents (73%) indicated that their number of forest visits had not changed during the COVID-19 pandemic. While about 18% of residents reported a high number of weekly visits to the forest (>5 times), the largest group of respondents (35%) reported visiting forests only 1–2 times per month. Most respondents (59%) reported visiting rangelands at least once per week.

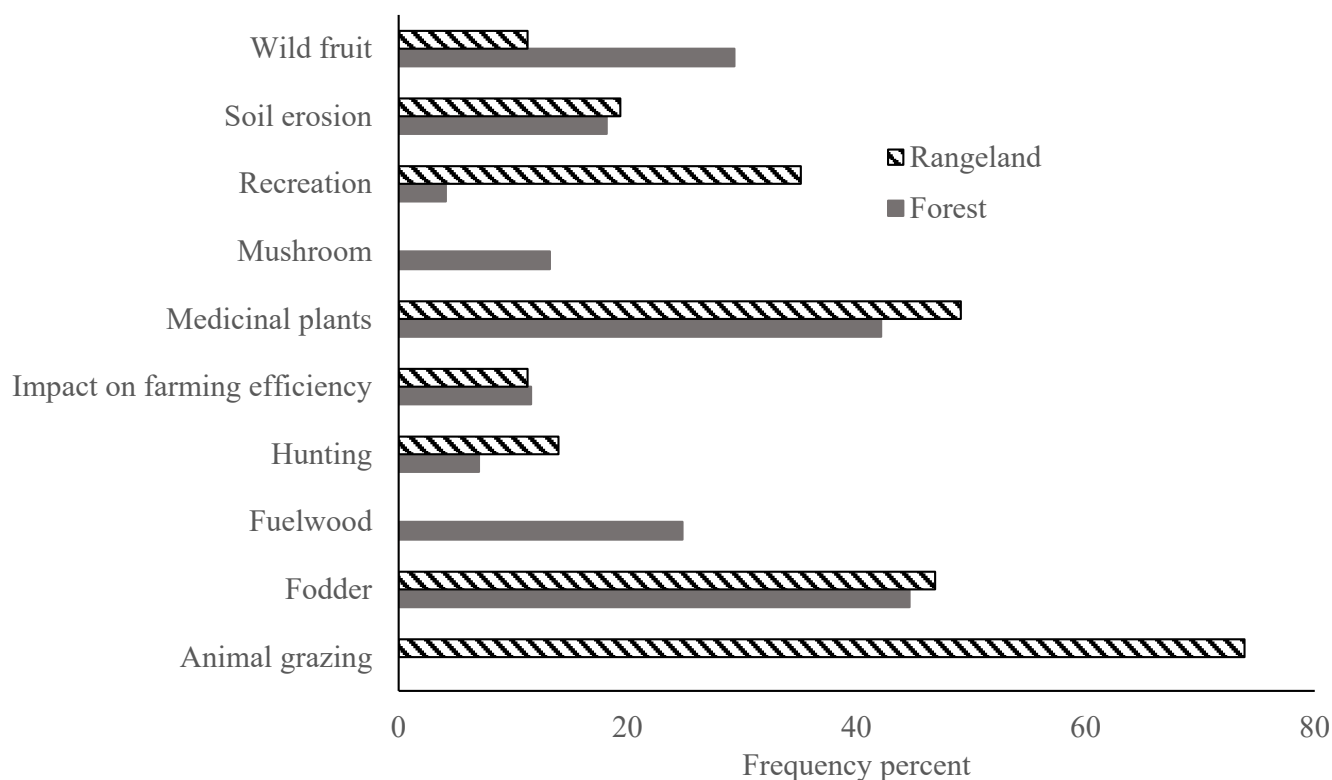


Figure 9. Household-level perception of forest and rangelands benefits during COVID-19 in rural communities in Northwest Iran.

4. Discussion

We expected the COVID-19 pandemic to have a negative effect on total rural household income and a positive effect on relative forest income as households increased their harvest of environmental products. While we found a negative effect on total household income, this effect was not significant. The sign for relative forest income was also negative, although it was not significant. In the following section, we discuss the factors that might explain these findings and how they resonate with the existing literature.

4.1. The COVID-19 Impact on Rural Household Income

First, we consider the negative but not significant impact of the COVID-19 pandemic on total household income. Most households pointed to lower livestock income as the main explanation for the negative trend in total income, particularly due to supply chain disruptions. Such market disruptions have also been reported elsewhere, including in forest product markets such as those for timber and non-timber forest products in Nepal [44]. Due to the large variation in the portfolio of activities constituting rural livelihoods [31], this could indicate a large contextual variation in the effect of COVID-19 on rural incomes. This is supported by similar conclusions emerging in the literature: using qualitative interviews, Gupta et al. [45] found asset-related impact differences in 16 villages in India and Nepal. Arguably, this is not a new finding but one that is generally accepted in the disaster literature [46]. There is a lack of studies on the nexus of rural households and environmental products documenting the impact of the COVID-19 pandemic on income changes. At the product level, there are divergent findings, with reports of both increased and decreased forest product harvesting in response to COVID-19 even within the same geographical units, e.g., in central Nepal, Bista et al. [47] reported an increase in firewood use due to returning migrants while Laudari et al. (2021) reported disruption of the firewood market [22]. While this indicates the importance of distinguishing subsistence and commercial uses, a more substantial body of evidence is required before general

conclusions can be made. The present study is a contribution to this, finding a negative but not significant effect of the COVID-19 pandemic on rural households in northwestern Iran.

Relative forest income and total household income were influenced by different factors. The coefficient of age was positive but non-significant, as has been found in other studies. This indicates that older household heads were more reliant on environmental resource extraction. The opposite was found by [34]: young household heads tended to engage more in physically demanding forest product extraction.

Results showed that female-headed households have higher RFI. As [36] stated, gender has a significant effect on the decision to collect Aleppo pine seeds, suggesting that rural women can play an important role in harvesting forest products. Women focused their efforts on post-harvesting activities, mainly the shelling of cones and seed extraction. The more women in a household, the higher the relative income from forest products, which is explained by the very low opportunity costs of forest product extraction activities, low skill and capital requirements, and easy access [11,48].

Households with more years of education tend to have lower relative forest income. This is in line with the results of [9] who emphasized that the collection of forest products was negatively correlated with the education of the household head ($p < 0.05$). High-educated households have better access to other income opportunities. In previous studies, education has been shown to reduce forest reliance [12]. For those with formal education, lower access may also be indicative of higher opportunity costs of time for collecting forest products [12,37,38].

Our results showed that an increase in household size was positively correlated with RFI, which is in line with other studies [12,38]. Large families have more workers and greater opportunities to carry out labor activities. More agricultural land was associated with lower forest income and higher total income. Also, other researchers showed that farmland size had a negative correlation with RFI [12,49]. We observed a non-significant positive correlation between the number of livestock and RFI and a significant negative relationship between conducting animal husbandry and RFI. The latter is likely to reflect less time for engagement in forest product collection, as was found by [36]: engagement in livestock activity in rural areas of Tunisia had a negative and significant effect on the decision to collect forest products.

Our survey results showed that 61% of respondents believed that their food diversity during COVID-19 was not the same as before the outbreak of COVID-19. The same was reported by [50] in Bangladesh, where they found that 61% of Bangladeshi households did not get the same type of food as before the pandemic, and in India, 62% of respondents reported diet disruption [51]. Disrupted production and distribution of food due to COVID-19 have clear consequences for people in the Global South [51]. In addition, increased food prices due to COVID-19 decrease dietary diversity [52]. Our results also confirmed that a high percentage of respondents (70%) mentioned the higher food prices as a reason for food shortage during COVID-19.

4.2. Rural Households' Responses

The negative sign for relative forest income indicates a slight non-significant decrease in relative forest income due to the COVID-19 pandemic. Other studies focusing on the COVID-19 pandemic and its impact on the harvesting of environmental products have reported the same tendency [22,44,53]. This trend may be explained by viewing the COVID-19 pandemic as a negative shock to livelihood strategies. Using a large global comparative data set from almost 8000 households in the tropics and subtropics, Wunder et al. (2014) found that forests play a limited role as safety nets in response to unforeseen negative events. Instead, households resort to labor reallocation (e.g., increase in off-farm work), downward adjustments in asset holdings, reducing consumption, and accessing help from local social and economic networks [54]. This response pattern has also been verified in subsequent work [55]. We found the same response pattern in this case study in Iran in

terms of asset reduction and reduced consumption, indicating the limited role of forests as a green recovery [24] response option to COVID-19.

4.3. Limitation of the Study

While we find our data to be useful and contribute to a better understanding of the COVID-19 crisis in relation to rural households and environmental incomes, the data are limited in spatial and temporal coverage. Rural diversity is substantial, and different situations may prevail over relatively short distances, including in such a diverse country as Iran. Also, our analysis relied on the collection of static one-time data. Generating and using panel data would allow an assessment of changes over time and the dynamics of responses. As seen elsewhere [22], adding a qualitative approach can also be beneficial.

5. Conclusions

In our case study in northwestern Iran, we found a negative but not significant effect of the COVID-19 pandemic on total rural household income and that the COVID-19 pandemic led to a slight non-significant decrease in relative forest income. Both these patterns have been previously reported in the literature, although the body of evidence is still too limited to draw general conclusions regarding a differential effect of the COVID-19 pandemic on subsistence and cash incomes. The negative effect on relative forest income, however, resonates well with existing scholarship on livelihoods and negative shocks. While there is scope for increasing rural households' environmental income, in particular through environmental resources from rangelands, this would require explicit initiatives to maintain and increase incomes from forests and rangeland resources during disease crises, including avoiding closure of key markets (most notably those for livestock products), maintaining and increasing the production of key resources such as fodder for grazing, and the development of value-added secondary processing activities for gathered products such as medicinal plants, wild fruits, and mushrooms. Such interventions would need to be supported by research, in particular, to generate panel data that allows a better understanding of the dynamics of responses to diseases and to support improved productivity of key resources. The latter is the main shortcoming of the present study (it is limited to a snapshot of 2020–21).

This study indicates that rural communities in Arasbaran, Iran, would benefit from outside support such as direct cash transfers, food support, and markets for their products. We believe that our results could help Iran and other similar countries to be better prepared for future crises, facilitating speedy recovery after such crises. Countries like Iran need to focus more objectively on prevention rather than cure, and this is the time to think and act proactively. Further research is needed to increase our understanding of the impact of the COVID-19 pandemic on environmental resources, including forests and rangelands. This includes studies on the impact on environmental product supply chains. Also, as the pandemic is not yet over and some impacts may take a longer time to emerge, studies spanning longer time horizons are required.

Supplementary Materials: The following supporting information can be downloaded at <https://www.mdpi.com/article/10.3390/f14091918/s1>.

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