

Non-timber Forest Product and its Impacts on Livelihood in the Middle Hill: A Case of Lamjung district, Nepal

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Abstract

Lamjung is highly rich in its vast and valuable Non-Timber Forest Products (NTFP) including different kinds of valuable medicinal and aromatic plants. Nepal is a mountainous country, where most of the people are depend on forest resources for their livelihood. Non-Timber Forest Product (NTFPs) plays a crucial role in the rural livelihood. NTFPs serve as a source for their primary health, nutrition, income generation, energy (fuel wood) and material for a social-cultural and religious ceremony. The research was carried out the specific objectives of identification availability NTFPs, Role of NTFP in local livelihood, prospects, and problems to develop NTFP in the study area. The study was carried out in Chiti, Jita and Taksar Village Development Committee (VDC) of Lamjung District. Primary data were collected through Focus Group Discussion, House Hold Survey, Key Informant Interview, use inventory sheet and direct field observation. Secondary data were collected from different DFO office, library, journals, published articles, reports, online reports etc. The quantitative data were analyzed by using appropriate statistical tools. The qualitative data were analyzed by descriptive measure and presented in forms of charts, figure and tables. There were 52 major NTFPs identified in the study area and all respondents have knowledge about NTFPs, but they are not involved to collect NTFP for commercial purpose. They use only household purposes such as firewood for energy, leaf litter for religious purpose, and wild food and fruits are used for domestic use. The main problems of the development of NTFPs people are gradually leaving use traditional knowledge about medicinal plants. Slowly they became dependent at modern product and most of the people are depending on remittance. NTFPs play a safety net role to assist communities in adverse situation such as crop failure under the current change in climate and variability. Most of the people have knowledge about value of NTFPs and traditional knowledge about medicinal herbs, but such a valuable knowledge regarding use value of NTFPs seems to be disappearing into the younger generations.

Keywords: NTFP, firewood, leaf litter, medicinal plant, livelihood, Lamjung.

1. Introduction

Non-Timber Forest Products (NTFPs) are an important part of the Nepalese economy. From the very beginning of human civilization, people have used forest product as food, shelter, textile and medicine. NTFPs give significant sources of subsistence, income and employment to the people everywhere there are forests. In the rural settings of Nepal, people are closely associated with the forest and its products, such as NTFPs. which are being increasingly recognized for their role in rural livelihoods. Harvesting of NTFPs has been a long history in the human civilization (Delgado, McCall, & López, 2016) and it is associated with socio-economic and cultural life of forest dependent communities inhabiting in wide ecological and geo-climatic conditions throughout the country (Pandey, Tripathi, & Kumar, 2016). NTFPs refer to a wide array of economic or subsistence materials that come from forests, excluding timber. These are also termed as non-wood, minor and secondary forest products (FAO, 1992). Belcher (2003) defines NTFPs as all goods of biological origin derived from forests or any other land under similar use and exclude timber of all forms. NTFPs, which include hundreds of species of traded and locally used forest products of biological origin, employ thousands of collectors, traders and exporters in Nepal for at least some seasons in a year. NTFPs such as fruits and nuts, vegetables, medicinal plants, gum and resins, essences, bamboo, rattans and palms; fibers and flosses, grasses, leaves, seeds, mushrooms, honey and lac etc. are widely available in the forests of Nepal (Pandey, Tripathi, & Kumar, 2016). Among all categories of NTFPs medicinal and aromatic plants (MAPs) play vital role in Nepalese livelihood, health, and

socio-economic prospects (Bhattarai, Shrestha, & Lekhak, 2007). Use of herbal medicine in Nepal represents a long history of human interaction with the environment which is an important part of the Nepalese economy. Nepal constitutes a unique and enormous diversity of flora and fauna within a relatively small geographical area. In spite of being a small country, it around 7000 species of vascular plants with 2321 species medicinal plant (Rokaya, Münzbergová, Shrestha, & Timsina, 2012).

NTFPs should be understood, managed and traded as an additional product and opportunity to the timber rather than amplifying it as a substitute (Banjade & Paudel, 2008). Biological diversity in Nepal is closely link to the livelihoods of many people and their economic development, and touches upon agricultural productivity and sustainability, human health and nutrition, indigenous knowledge, gender equality, building materials, climate, water resources and the aesthetic and cultural well-being of the society (Bhattarai K. R., 2004). One-third of rural people in Nepal collect and trade forest products, which in 2010 generated USD 7.66 million and benefitted 78,828 participants (Chitale, Silwal, & Mat, 2018). About 44.6 % area covered by forest of total area of Nepal and forestry contributed 0.92 billion NRs revenue for national GDP in fiscal year 2072/73 (NPC, 2016). Nepal is a rich in biological diversity so NTFPs is most important part of Nepalese economy, which meets people's needs without deforestation.

The market of NTFPs is extending, and this is an open door as well as a challenge for a progressively maintainable, proficient and equitable management of NTFP assets. NTFPs constitute an important source of livelihood for the people from forest far-flung communities in Nepal. It is associated with socio-economic and cultural life of forest dependent communities inhabiting in wide ecological and geo-climatic conditions throughout the country. For a long time, NTFPs have been a significant livelihood commodity in rural Nepal as a traditional source of medicine, food, and fiber. However, the significance of NTFPs have been perceived as of late. Similarly, the NTFPs also serve as a vital livelihood safety net in times of hardship to the local people. However, depletion of NTFPs resources on account of indiscriminate exploitation, deforestation and forest degradation have a major issue of concern that may affect the NTFP based livelihood and economics. Thus, NTFPs can play an important role in rural livelihood strategies and can contribute to sustained forested landscapes in the country, but there is no simple answer to how important NTFPs are in rural livelihoods.

2. Methods and Materials

This study has been selected three VDCs (Chiti, Jita and Tandrang/Taksar) are it located in the Lamjung District of the western part of the Nepal. The study area is divided into two sites on the basis of the small watershed area. The Chiti VDC is included in site one and Jita and Taksar VDCs are in site two. Most of the people of the area are engaged in agriculture, which is widely affected sector from climate change. The VDCs were stratified into two groups –watershed area of Marshyangdi river in Chiti VDC i.e. ward number 3, 5, 9, 8,7and 6. The watershed area of Risti river in Jita VDC i.e. ward number 4, 5, 7, 8, and 9 and Taksar VDC i.e. ward number 1, 2, 5, 6, 7,8and 9. The other wards of the VDCs were excluded in the household survey.

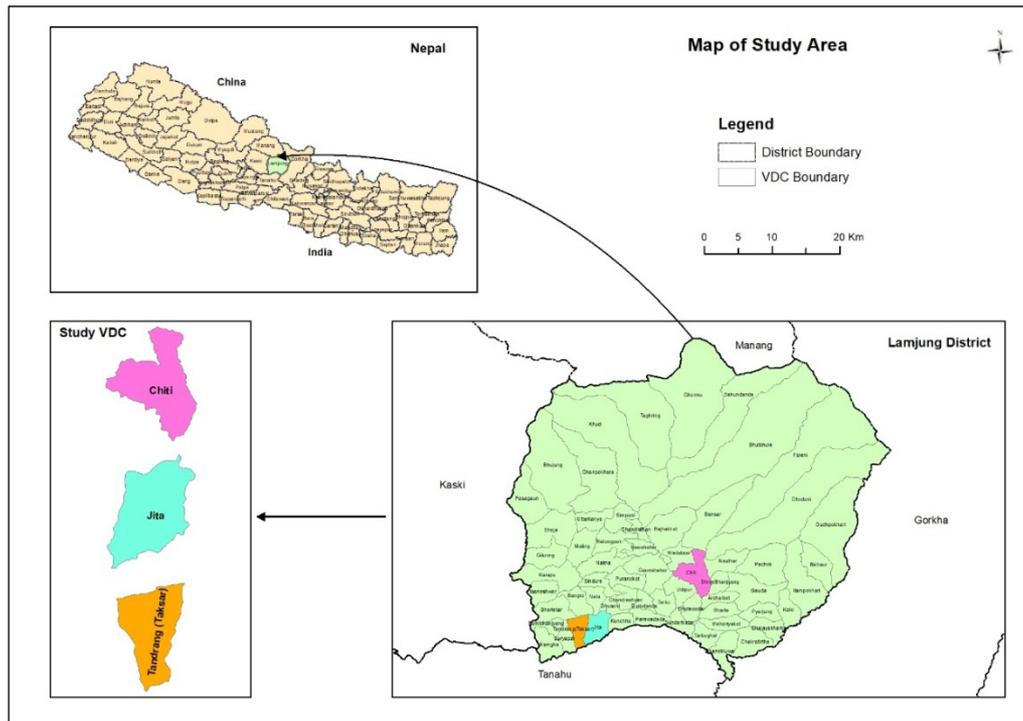


Figure 1. Geographic and administrative details of the study area

Data were collected from primary and secondary sources. Primary information was collected from 150 households through random sampling procedure. Random table was used for the selection of the households in the study area. In addition to that, field observation, six key informant interviews (KII), and two focus group discussion (FGD) with stakeholders in both sites. While secondary data were extracted with the help of published and unpublished documents and relevant literature regarding livelihoods and NTFPs as well as its prospects and problems to promote which was collected mainly supplement primary data and for some new information as well. Table 1 shows the total number of households by VDC and selected households for survey. The watershed area of Marsyandi River in Chiti VDC, which consists of 12 sub-watersheds. Risti watershed of Jita and Taksar VDCs which consists of 34 sub-watersheds were taken as strata and 75 households were taken from each site. Besides that, study areas were divided into three different ecological regions by their elevation (600-800m valley, 800-100m middle hill, and above 1000m high hill) for the study purpose from which we know the about non-timber forest production overall in the study area.

Table 1. Number of a household by VDC and sample size

VDCs	Selected ward	Total HHs	Sampling HH
Chiti	3,5,6,7,8,9	1299	75
Jita	4,5,7,8,9	578	38
Taksar	1,2,5,6,7,8,9	619	37
Total		2496	150

Source; CBS, 2011.

4. Discussion and Result

Based on the direct field observation, focus group discussion, and key informant interview with local peoples; it was revealed that number of NTFPs can found in the community forests, national forests and private forests. There are 52 major NTFPs are found in the study area. The common NTFPs are Kurilo, Bans, Nigalo and Katus (*Asparagus racemosus*, *Dendrocalamus* spp, *Arundinaria falcate* and *Castanopsis tribuloides*).

In the study area, NTFPs plays an important role in the in the livelihoods as a source of construction materials, medicine, food, and income. Access to forest resources helps rural households diversify their livelihood base and reduce their exposure to risk. Earnings from forest products are often important as a complement to other income. Very large numbers of households generate some of their income from selling forest products, often when farm production is not enough to provide self-sufficiency year-round. Income from forest products is often used to purchase seeds, hire labour for cultivation, or generate working capital for trading activities. For the poorest households, NTFPs can play a critical role in providing both food and income.

4.1 Collection and Uses of NTFPs

The Food and Agriculture Organization (FAO) estimates that 80 percent of the population in the developing countries relies on NTFPs for nutritional and health needs (FAO, 2003). According to the respondent and field observation, there are different kinds of NTFPs available in the study area. These includes medicinal plants, wild vegetable, firewood, leaf litter, grasses, and wild fruits. Non-timber plant resources have been consumed as food, vegetable, religious purpose, firewood, fodder and medicinal purpose since prehistoric time in the study area. There is no any respondent of the study area practice to collect NTFPs for commercial purpose. The respondents are only used NTFP to the domestic purpose.

Among them, 39% Plants were related to Medicinal plants such as *Harr and Barro* (*Terminalia chebula* and *Terminalia bellirica*) etc. and 35% species were related to edible plants, such as *Katus, Kafal, Tarul* (*Castanopsis tribuloides*, *Myrica esculenta*, *Litsea monopetala*) etc. And 31% were other NTFPs which were used as tools such as *Nigalo, Bas*, (*Arundinaria falcate*, *Dendrocalamus spp*) etc.

4.2 Role of NTFPs in Livelihood

Non-timber forest product (NTFP) use is an integral part of the rural economy of Nepal (Bista & WEBB , 2006). In the study area, most of the people are dependent on agriculture as the main source of livelihood and it covers rural area of Lamjung district. NTFPs is playing vital role in livelihood in different ways, such as, as firewood, fodder, fruit, agricultural tools, leaf litter, food, medicinal and construction material in the study area.

4.3 Firewood Production

Forests form an integral part of rural livelihoods in Nepal (Piya, Maharjan, joshi, & Dangol, 2013). Forest products not only provide the rural population with subsistence needs like fuel wood, fodder, and litter, but also provide wild foods during the periods of food shortage. Firewood is any wooden material that is gathered and used for fuel. It is one of the parts of NTFPs, where people usually collect dry branches and old plants collect from forest. It is most important of rural livelihood. Likewise, it is not only consumed by a human being but also indirectly consumed by livestock, mainly for preparing fodder. In the study area people have collected firewood under the rules and regulation of Community Forest. There is all respondent reported they involved to collect firewood as energy.

Firewood is a major source of energy of study area. The table 4 shows the collected firewood in a year by sampled household. Among the total household, 37 households were collected between 0-19 (Bhari¹= around 20kg?) firewood in year. Likewise, 95 households were collected 20 to 49, 12 households were collected 50 to 99 Bhari and 6 households were collected 6 Bhari in a year. In the study area, average 29 Bhari use of firewood was collected by a household for using energy in kitchen.

4.4 Use of Firewood by Caste Ethnicity

There are different castes residents in the study area. According to caste, the using of firewood has been different. Among the different caste Gurung is the highest proportion in used of firewood in a year, which 45 bhari (on average) used in a year. Then, Chhetri is second in ranking, which caste used firewood 30 Bhari. Likewise, Khawas, 28, Thakuri, 26, Dalit, 25, Bhrahman 24, Newar 21, Tamang 15, Magar 13, and Cheapang, is 11, respectively. Gurungs were used firewood to make indigenous local alcohol from ancient time. Therefore, they use more firewood than other ethnic groups. Likewise, the Magar, Tamng and Chepang are used firewood less proportion than other caste groups because they were migrants and they involve different activities for their livelihood. Such as wage labour, shopkeeper, business etc. So, they use alternative energy like electricity and Gases.

4.5 Collection of Firewood by Ecological Region

¹ Bhari= Way of local measurement

According to the ecological zone, the degree of using firewood is different, because the high region has cold climate than the lower region. The firewood used also keeping warm in the cold season. The people of high region used of firewood are more than other regions. In high region a household used firewood 38 bhari in a year. Comparatively other regions, in middle region, used 26 bhari and in low region only used 19 bhari in a year. The high regions people used firewood to energy for cooking as well as keeping warm in cold season, so that they need more firewood than other region's people do. As well as, this study area is low developed than other area of Lamjung district, so that there is no available alternative energy source like Liquefied petroleum (LPG) gas comparatively low region. Thus, the low region's people are used alternative and modern energy source, therefore the demand for firewood is high proportion in high region

4.6 Participant to Collect Firewood

This study found out the gender wise involvement in the family to collect firewood. There are in 17% respondent reported that the male to involve to collect firewood. Likewise, in the 46 % family were female, and in the 43% family were both male and female involved to collect firewood (Figure 2).

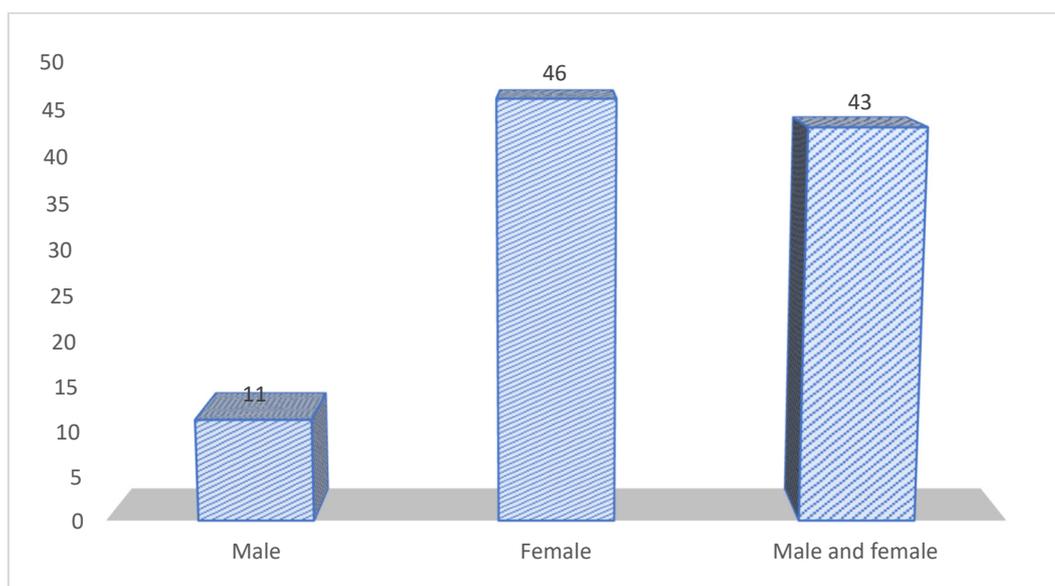


Figure 2. Gender wise involves collecting firewood

4.7 Leaf Litter and Fodder Production

Leaf litter is the most important part of forest production. It plays a vital role in rural livelihood. In the study area, all respondent reported they were involved to collect leaf litter. They used leaf litter different ways such as, make plate, ginger pest, and make compost manure, the following table shows the purpose to collect leaf litter.

All of the respondents were reported that they collect leaf litter to religious purpose, they used leaf make plates (Duna, Tapari) in religious task and festival. Likewise, 20% respondent of total respondent reported they bring leaf litter to make compost manure for agriculture and 13 % respondent brings leaf litter for ginger pest. Thus, leaf litter is playing a vital role in the study area, but in present time because of modern technology, people are leaving gradually to use forest product. Like, people are leaving gradually make the compost manure they have been using chemical fertilizer, such as urea instead of compost manure. This study found out the gender wise involvement in the family to collect leaf litter. There is only 5% respondent reported that male involves collecting leaf litter, whereas 78 % female, 17% both male and female are involved to collect leaf litter.

4.8 Medicinal Production

Medicinal and Aromatic plants (MAPs) are commonly called “green gold”, as they provide the producers with opportunities to earn hand cash. Since time immemorial, such plants have been grown in Nepal, and they have high social, religious, cultural and economic value in our communities (Kunwar, Mahat, Acharya, & Bussmann, 2013). The financial contribution made by Non-Timber Forest Products (NTFPs), especially medicinal plants is significantly higher compare to the timber products. Participatory approaches have been developed through

community-based research and development programs in agriculture, forestry, watersheds, and resource management.

Medicinal plants use is an important subject of these community development programs in rural societies (Ji, 2001). The ethnic communities have significant customary knowledge on utilization of plant and plant parts and there is a long tradition of transferring this indigenous knowledge from generation to generation. The indigenous knowledge of medicinal plants is gaining recognition worldwide. Millions of people throughout the world currently derive an extensive portion of their subsistence needs and income from gathered plant and animal products (Walter, 2001).

This study recorded and identified a total of 52 plant species including trees, shrubs and grasses that are used by local people for medicinal purposes. Further, the study identified a total of 20 medicinal plant species in the study area. They used bark, leaf, root and stem of plants as medicine. However, there is no any respondents collect for commercial purpose. They just used medicinal plant when they have need. We noted that 54 plant species are used for *stomachache, diarrhoea, dysentery, constipation, digestion problem, gastric, stomach pain, cough and cold, pneumonia, cure fever, typhoid*, and also used for bone fracture problem in human as well as in animals. Most of the respondent has knowledge about medicinal plants and its availability of nearest area. Even though the only 27% respondent reported that, they used medicinal plants, as the domestic purpose and 73% respondent are not. In the study area people used species *Harro, Barro, Gurjo, Pakhanved, Amala, Bel, Bhojho* (*Terminalia chebula, Terminalia bellirica, Tinospora cordifolia, Bergeniaciliata, Phyllanthus emblica, Aegle marmelos, Acorus calamus*) etc. Thus, in the study area people are gradually leaving use traditional medicinal knowledge because they believed in hospital and veterinary.

4.9 Wild food/ vegetable production

Wild edible plants in Nepal are important sources of food supplements and have been utilized traditionally in local communities (Shrestha, 2001). It is one of the most important parts of forest products, which help to the fulfillment of human subsistence need, people can get protein, nutrition, fat, calories and needed vitamin from the wild food so that from human civilization people have been using wild food. This study finds out of the 52 NTFPs species collected, 18 were found to be wild edible plants. However, the people of study area, gradually leaving to use wild vegetable and foods. The following figure shows the wild food and vegetable users.

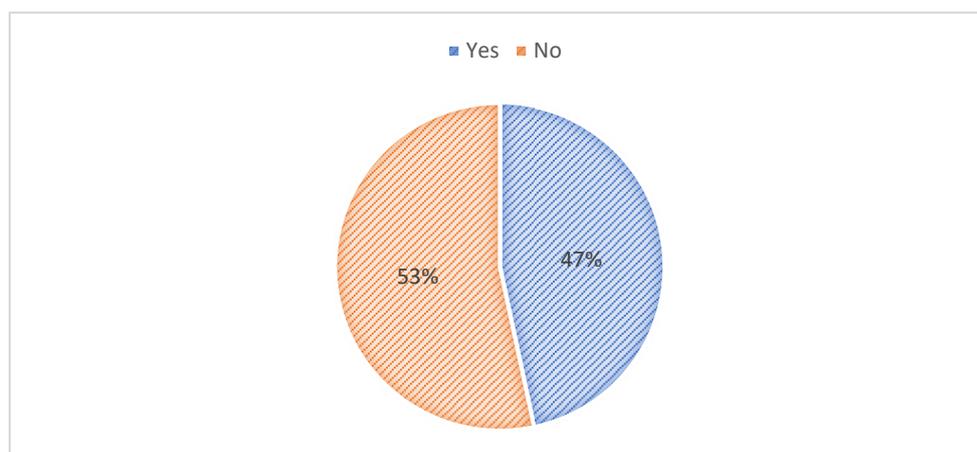


Figure 3. Wild Food Users

Among the respondents, 43% respondent reported they were used wild edible foods and 47% of respondents were not using wild foods (Figure 3). In the study area, especially they were used as vegetable and species, *Niguro, Tama, mushroom, Tanki, Tarul, Gitthaare* (*Fiddlehead fern, Tama edwardsi, Agaricus bisporus, Bauhinia longifolia and Litsea monopetala*) used as vegetable and *Timur, Tejpat and Jimmu* (*Zanthoxylum armatum, Cinnamomum tamala and Allium hypsistum*) are used as spices. Some of the wild foods are most famous due to our unique culture like; *Tarul* (*Litsea monopetala*) is very famous in rural area. Every year, Nepalese people used to have *Yam* (*Dioscorea*) in 1st day of Magh. Thus, the indigenous communities have been abandoning their traditions and by this means, they are losing their plant knowledge over time. The activities

such as change in land use, deforestation, urbanization, and cultural transformations are important causes to change practice and traditional knowledge of utilization of wild food plants.

4.11 Wild Fruit Production

Fruits are a major source of proteins, vitamins, minerals, fats and roughages (FAO, 1992). The majority of respondents (67%) admitted to doing not harvest different types of wild fruits from the study area. They reported that wild fruits are important food supplement in the village because they play an important role in human nutrition for the members of the family. However, they are gradually leaving to harvest wild fruits, especially they harvest *Kafal*, *Katus*, *Amala* (*Myrica esculenta*, *Castanopsis tribuloides*, *Phyllanthus emblica*) etc. People harvested wild fruits for the household consumed, there any no respondent harvested for selling purpose.

Among the wild fruit collector, there are 77% children, 14% male and 9% female were harvested wild fruit in the family (Figure 4). They consumed for the only household purpose. The following figure shows the involvement of gender in harvest wild fruit.

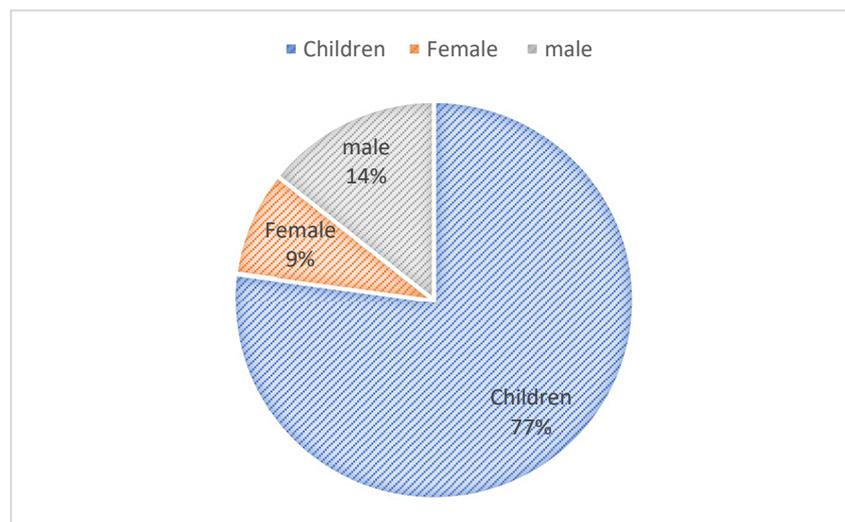


Figure 4. Involvement in wild fruit harvested

Figure 4 shows the majority of children (77%) involvement in harvested wild fruit. In the study area, people do not give priority to harvest wild fruit. This finds out, *Kafal*, *Katus*, *Amala*, and *Okhar* (*Myrica esculenta*, *Castanopsis tribuloides*, *Phyllanthus emblica* and *Juglans regia*) are main wild fruits of this area.

4.12 Prospects and Problems to Develop of NTFPs

The study area is EBA (Ecosystem Base Adaptation) project intervention site, where, the program has launched in 2013. This project has been supporting for enhancing capacity, knowledge and technology support to build climate resilience of vulnerable people of the study area. Since the project, intervention in this study area the project is playing a vital role in local people's livelihood such as it has created some employment and build the awareness about climate change and its impact on livelihood. Climate change brings out wide ranging effects on water resources, agriculture, human health and biodiversity in Nepal (Neupane, Acharya, & Thapa, 2019). In addition, the project has been supporting vulnerable groups for improving their livelihood like Chepang, where eight Chepangs houses are staying in the bank of the Marysngdi River of the study area. Among the other caste groups, they Chepangs are more vulnerable groups so banana plantation in the bank of Marsyandi River. As well as, the project has established two nurseries and distributing different kinds plants (free with intensive money) to control soil erosion and increase forest area. There is two nurseries established in each side with the aim 100000 seeds distribute in every year. The project has been distributing the different kind plants with freely and financial support as incentive. Total 185,682 seeds distributed and around 300-ropani barren land has been plantation in study area. It helps to increase the forest cover area and control the soil erosion as well as helps increase NTFPs.

5. Conclusion

From the above analysis of the study, it is clearly indicated that the study area has the high probability of promoting NTFPs for the livelihood improvement in the coming days. People are becoming more and more aware about the economic importance of NTFPs. However, mainly due to the lack of technical knowledge, lack of importance of NTFPs and institutional support, they are not taking NTFPs as their main occupation. Most of these NTFPs are open access and are over-harvested; as a result, their management is vital to any forest management scheme. NTFPs have comparative advantage in the high mountain region, timber management yields far more income than NTFPs, particularly in the Tarai (Banjade & Paudel, 2008). NTFPs are important to reduce poverty in rural areas.

This study was focus on the assessment of the role of NTFPs to the livelihood of three VDC (Jita, Taksar, and Chiti) in Lamjung District. NTFPs still play a safety net role to assist communities in adverse situation such as crop failure under the current change in climate and variability. A total of 52 plant species were identified to be harvested as NTFPs. The majority of respondents (85%) around of study area involved in different community forest and they were harvested under the rule and regulation of community forest.

There is the most important source of energy used in the study area and dry branch and old tree plant species were recorded to be used for wood fuel. Most of the important part is firewood and leaf litter of forest production, 100% respondent was collected firewood and leaf litter from the forest.

In this study area, people are used only household purpose; they could not get benefits properly from the forest. They are gradually leaving using indigenous knowledge about forest product. Regarding problems, there is no product for market-oriented production and facilities for cultivation and harvest. Majority of respondent HHs do know about the value of NTFPs and they not practiced it as commercial purpose.

Being an indispensable part of the Nepalese farming system, forest plays supportive role in the livelihoods of rural communities. This study area is totally based on the rural community where people are depending on substance agriculture for livelihood and depending on forest directly or indirectly. Most of the people have knowledge about value of NTFPs and traditional knowledge about medicinal herbs, but such a valuable knowledge regarding use value of NTFPs seems to be disappearing into the younger generations. Even though there are many available NTFPs, they do not practice for income generation and collect commercial purpose. Hence, holistic and comprehensive management practices incorporating local knowledge would be the sustainable approach for sustainable livelihoods of the community.

Author Contributions

Raj Kumar Rai had the original idea for this paper. Kanhaiya Sapkota had reviewed the manuscript and provided input in writing and finalizing the paper. Basanta Kumar Neupane had written this manuscript. All authors have read and approved the final manuscript.

Competing Interests

Author has declared that no competing interests exist.

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